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CREATING DRG-BASED PHYSICIAN REIMBURSEMENT SCHEMES: A CONCEPTUAL AND EMPIRICAL ANALYSIS

Year 1 Report

RESEARCH REPORT

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CREATING DRG-BASED PHYSICIAN REIMBURSEMENT SCHEMES: A CONCEPTUAL AND EMPIRICAL ANALYSIS

<u>Year 1 Report</u>

by

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1.0 EXECUTIVE SUMMARY

1.1 Statement of the Problem

The rapid escalation in physicians' services expenditures in the last 15 years no longer needs documentation. In 1965, the U.S. spent $8.5 billion on physician services alone; by 1982, this number increased more than seven-fold to $61.8 billion (Gibson, et al., 1983). This represents a compound rate of growth of 11.7 percent. The federal share of this outlay has been growing as well, from 15 percent of physician expenditures in 1970 to 22 percent in 1982. One out of every five dollars spent on physicians' services is being spent by the federal government through Medicare and Medicaid.

Of course, part of this increase can be attributed to population growth and inflation in the economy as a whole. These factors account for only two-thirds of the growth in physician expenditures over the last decade, however (Freeland and Schendler, 1983). Part of the additional dollars were accounted for by physician fee increases, above and beyond general price inflation. Even so, over one-quarter of the growth in expenditures (27.4%) remains "unexplained", but is usually ascribed to service intensity, e.g., more surgeries per hospital stay, more lab tests, more in-hospital visits per admission. This happens in three ways: unpackaging of physician services, procedure inflation, and the involvement of multiple physicians.

Unpackaging is the practice of submitting an itemized bill for every service performed; like ordering a la carte from a restaurant menu, the total charge is invariably higher. Examples include charging separately for post-operative visits instead of including them with the fee for the surgery itself, or charging separately for each lab test rather than including them in a global office visit fee.

Procedure inflation is the practice of billing under a more complex (i.e., more expensive) procedure code for the same service. This is particularly likely to occur as the number of categories grows larger and the distinctions between them become blurred. In 1965 physicians could bill one of 2,000 codes for a given service; they now have over 6,000 to choose from.

Finally, Medicare expenditures for physicians' services are increasing in part because of the sheer number of physicians involved during a single episode of illness, all of whom submit independent bills. Take a routine

surgical admission, for example. Besides the surgeon and the anesthesiologist, there may be an assistant surgeon, radiologist, pathologist, a variety of consulting specialists, as well as the patient's personal family physician providing routine hospital visits. The latter visits, of course, are in addition to the follow-up care that is to be provided by the surgeon who performed the operation.

Traditional cost control approaches like fee freezes will not curb these sources of expenditure increases, and could actually exacerbate them. (This is in fact what happened during the wage and price controls imposed from 1971 to 1974 under the Economic Stabilization Program. See Holahan and Scanlon, 1978.) Effective cost control can only be achieved by controlling prices and the number of services simultaneously, and this requires an innovative approach to reimbursing physicians. How can this be done? One solution is to "package" physician services, to re-define the payment unit from a narrow procedure to a more comprehensive bundle of services.

The major advantage to packages is that they encourage the physician to take a broader view of the patient care process, with incentives to cut back on marginal procedures. Under the current reimbursement system, the physician bears no financial risk in ordering diagnostic tests or requesting specialty consultations. He/she uses the services of other physicians in his/her treatment of the patient without having to pay for them. The financial burden of this care is borne wholly by the Medicare program and the beneficiary. Packaging physician services restores much of the burden to the physician making the decision, as with any entrepreneur. Packages are also less intrusive in that responsibility for monitoring utilization rests with the physician rather than with an outside agency.

HMOs, of course, are the ultimate package; all physician and hospital services are bundled together and a single payment made. There are, however, a number of packaging approaches that are less comprehensive than HMOs but which might be more easily incorporated into the current fee-for-service reimbursement system. (See Mitchell et al., 1983 for description and analysis of a range of packaging options.) One approach that has gained considerable attention recently is to package all inpatient physician services; this has become popularly known as "physician DRGs" or "MD-DRGs".

What is a physician DRG? To a certain extent, MD-DRG is a misnomer for it implies that a casemix classification system was developed expressly for physicians. Rather, what is usually meant by MD-DRG is a prospective reimbursement system for inpatient physician services much like that currently used by Medicare for inpatient hospital care: a fixed case payment per hospital admission, where the size of the payment is determined by the patient's DRG. Under this approach, all services performed by physicians and normally billed as Part B services would be combined in a single bill and a single payment made.

Physician DRGs have considerable appeal for policymakers. The payment unit (i.e., the hospitalization) is easily and objectively defined; a casemix classification system for inpatient care (i.e., the DRGs) has already been developed and is operational; and this approach would more closely align physicians' incentives with those of hospital administrators under the Medicare PPS. For these and other reasons, Congress has asked that DHHS examine the feasibility of physician DRG reimbursement. This report presents work in progress on precisely this question.

1.2 Summary of Findings

1.2.1 Overview of Methods

In this study, for the first time, we examine physician DRGs, what they look like and how much they cost. Hospital episodes were constructed from 1982 Medicare hospital and physician claims in two states: New Jersey and North Carolina. These states were chosen because of their different regional location (Northeast and South) and urban/rural location.* Hospital admissions were classified into DRGs using the Yale Grouper software, and physician (Part B) bills were then merged on at the patient stay level. These represented all physician services provided during the hospital stay, as well as physician services (Part B and Part A outpatient) provided during the week before and the week after hospitalization, to capture possible outpatient activity associated with the admission.

For many analyses, the individual case (hospital admission) was the unit of observation, but for our simulations of potential winners and losers, we

*We are currently adding two states from the West and North Central regions: Washington and Michigan.

were interested in who would receive the DRG payment. For these analyses, we aggregated cases to the individual attending physician, the medical staff, and the hospital levels, respectively. Winners and losers were determined by comparing physician costs for each case in a given DRG with the DRG average for urban and rural areas, and then cumulating gains and losses across all cases and DRGs to arrive at a total gain (or loss). Since absolute gains (losses) will vary by size of practice, gains and losses were expressed on a per case basis for comparison across attendings (or medical staffs or hospitals).

Mean physician DRG payments were determined simply by the average costs for all physician services provided during the hospital stay. Physician costs were defined as Medicare reasonable charges. Hospital costs by DRG were often included for comparison. These costs were based on submitted charges which were then adjusted to reflect Medicare operating costs using each hospital's Medicare Cost Report. For ease of presentation, we have referred to both the Part A and Part B components as costs. In both instances, costs represent what the Medicare program actually paid in 1982, including patient deductibles and copays.

1.2.2 Medical vs. Surgical DRGs for Physicians

Table 1-1 presents mean physician DRG payments for 25 high-volume medical and surgical DRGs. Together, these DRGs account for roughly one-third of all Medicare admissions. In parentheses next to each DRG payment is its coefficient of variation (CV). Lower CVs indicate less cost variability within DRG. Mean payments vary across MD-DRGs much as we might expect.

- Surgical DRGs cost 3-4 times more to treat from medical DRGs, $1500-$2500 versus $500-$700 in New Jersey, for example.
- Cases with complicating conditions or with more complex surgery are usually (but not always) more expensive admissions.

More important than the average payment level is the variation around that mean, for this indicates the likelihood that the DRG payment will in fact reflect the costs incurred by the physician.

- Surgical DRGs are quite homogeneous, with CVs of 0.40 or lower, implying relatively little variation in physician inputs.

TABLE 1-1

MEAN DRG PAYMENTS FOR HOSPITALS AND PHYSICIANS (CVs in parentheses)

DRG		New Jersey		North Carolina	
		Hospital	Physician	Hospital	Physician
14	Specific Cerebrovasc Dis exc TIA	$3162 (1.06)	$ 763 (0.74)	$2524 (1.07)	$ 418 (0.90)
15	Transient Ischemic Attacks	1947 (0.90)	575 (0.69)	1377 (1.10)	343 (1.10)
16	Nonspecific Cerebrovasc Dis w/ CC	3109 (0.85)	737 (0.70)	--	--
17	Nonspecific Cerebrovasc Dis w/o CC	2132 (0.84)	592 (0.76)	1830 (1.06)	370 (1.03)
39	Lens Procedures	1218 (0.56)	1842 (0.26)	1099 (0.49)	1293 (0.21)
89	Pneumonia Age 70+ &/or CC	3296 (1.02)	604 (0.88)	2315 (1.10)	320 (0.92)
90	Pneumonia Age 18-69 w/o CC	2667 (1.06)	562 (1.01)	2178 (1.23)	311 (0.98)
115	Perm Pacemaker Implant w/AMI or CHF	9354 (0.51)	2594 (0.29)	8241 (0.51)	1715 (0.29)
116	Perm Pacemaker Implant w/o AMI or CHF	7186 (0.43)	2259 (0.30)	6693 (0.50)	1571 (0.30)
127	Heart Failure & Shock	2871 (0.97)	573 (0.84)	2274 (1.18)	348 (0.94)
132	Atherosclerosis Age 70+ &/or CC	2578 (1.44)	544 (0.78)	2113 (1.11)	374 (1.28)
133	Atherosclerosis Age <70 w/o CC	2609 (1.32)	592 (1.38)	2070 (1.12)	443 (1.44)
140	Angina Pectoris	2080 (0.70)	468 (1.00)	1710 (0.91)	331 (1.59)
148	Major Bowel Procs Age 70+ &/or CC	7090 (0.87)	2555 (0.40)	5426 (1.04)	1673 (0.41)
149	Major Bowel Procs Age< 70 w/o CC	5833 (0.71)	2438 (0.36)	4679 (0.81)	1591 (0.34)
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	1986 (1.10)	588 (0.81)	1369 (1.12)	330 (0.94)
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	1747 (0.88)	573 (0.82)	1256 (0.96)	333 (0.92)
195	Cholecystectomy w/CDE Age 70+ &/or CC	5445 (0.76)	2200 (0.31)	4479 (1.10)	1493 (0.30)
196	Cholecystectomy w/CDE Age < 70 w/o CC	4498 (0.79)	1980 (0.30)	3360 (0.73)	1430 (0.28)
197	Cholecystectomy w/o CDE Age 70+ &/or CC	4139 (0.96)	1855 (0.38)	3258 (0.80)	1246 (0.30)
198	Cholecystectomy w/o CDE Age < 70 w/o CC	3018 (0.65)	1631 (0.32)	2643 (0.66)	1182 (0.26)
209	Major Joint Procedures	6023 (0.57)	2842 (0.33)	5801 (0.52)	2576 (0.23)
294	Diabetes Age 36+	2391 (1.02)	533 (0.88)	1691 (1.08)	303 (0.93)
336	Transurethral Prostatectomy Age 70+ &/or CC	2767 (0.77)	1679 (0.30)	2165 (0.63)	1219 (0.23)
337	Transurethral Prostatectomy Age < 70 w/o CC	2231 (0.70)	1545 (0.22)	1886 (0.64)	1174 (0.21)

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

- Medical DRGs vary dramatically, with CVs ranging from 0.70 to over 1.50, suggesting that physicians would end up being either significantly under- or over-paid in nearly every case.

Why do we observe so much more variation in these medical physician DRGs?

- Surgical DRGs are usually managed by physicians in the same specialty, (or at most two specialties). Not only do they tend to charge similar fees, but they also are apt to use similar inputs from other physicians. By contrast, attending physicians for medical DRGs come from a wide range of specialties, ranging from general practice to subspecialties like cardiology.

- Another reason for differences between medical and surgical DRGs may lie in the extent to which certain physician inputs are fixed or non-discretionary. Surgical DRGs always include both a surgeon and anesthesiologist; together they account for two-thirds or more of the total DRG cost. The only fixed input for medical DRGs, on the other hand, is the attending physician, and even this input will vary tremendously, as a function of length of stay.

How well do DRGs as a group explain variation in physician costs? In order to have a reference point for comparison, we also tested the ability of the DRG classification system to predict hospital costs. Since the system was developed based on hospital cost data, it would not be fair to expect DRGs to do a better job of explaining cost variation for physicians than for hospitals.

Table 1-2 summarizes the variation (as measured by the R^2) in hospital and physician costs explained by DRGs, based on analysis of variance.

- DRGs are far superior in explaining physician cost variation with an R^2 of 0.57 based on all cases vs. only 0.16 to 0.18 for hospitals.

- Excluding outlier cases definitely boosts the R^2s but does not narrow the differential in explained variance between the two sets of costs.

- Virtually all of the explained variation in total physician and in hospital costs was due to surgical DRGs. The surgical DRGs account for one-third of the variation in (untrimmed) hospital costs for surgical admissions, and one-half to two-thirds of the variation in physician costs.

- Medical DRGs are unable to explain more than a small percent of costs for medical admissions. Even after eliminating outlier cases, almost 95 percent of the variation in physician costs for non-surgical cases remains unexplained, that is, explained by other (unknown) factors not captured by the DRG system.

TABLE 1-2

VARIATION (R^2) IN HOSPITAL AND PHYSICIAN COSTS EXPLAINED BY DRGS

All Cases	New Jersey Untrimmed	New Jersey Trimmed[a]	North Carolina Untrimmed	North Carolina Trimmed[a]
All DRGs - Hospital	0.18	0.32	0.16	0.32
- Physician	0.57	0.70	0.57	0.75
Surgical DRGs - Hospital	0.31	0.48	0.33	0.51
- Physician	0.53	0.62	0.64	0.71
Medical DRGs - Hospital	0.06	0.11	0.04	0.09
- Physician	0.05	0.07	0.03	0.06

[a]Trimmed data exclude outliers, defined as cases exceeding three standard deviations from the geometric mean.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

Do these findings suggest that physician DRGs might be more appropriate for surgical admissions alone? This has some definite appeal, for policymakers could cap over one-half of inpatient physician costs by constraining a relatively small number of cases. Surgical DRGs constitute only 25-30 percent of admissions, but account for 56-58 percent of the Medicare physician dollars in our two states. On the other hand,

- Failure to simultaneously constrain medical DRGs could drive up total physician expenditures, as medical specialists squeezed out of their consultative roles in surgical admissions seek to recoup lost income through their treatment of medical cases.

- There may still be substantial casemix diversity at the individual surgeon level. It appears, for example, that ophthalmologists who lose money do so in large part because they are performing more complex procedures within-DRG.

1.2.3 The Averaging Principle

Any case payment approach like physician DRGs involves some sort of averaging. It is assumed that some cases will require more physician services and some cases will require less, but that on average the DRG price is a reasonable reimbursement for the services provided. High CVs, especially for medical DRGs, suggests that whether a physician wins or loses on any one case will be largely random. Gains or losses on any one case, however, may be less important than gains or losses for the DRG as a whole, and particularly for the practice as a whole. Do winning and losing admissions cancel each other out, leaving total Medicare revenues unchanged?

- Given the small number of cases a physician treats within a given DRG (generally 2-3 on average), there is little opportunity for gains and losses to cancel each other out at the DRG level. Only ophthalmologists are able to concentrate their practice in a few DRGS.

- Although some cancelling out takes place across DRGs, it is fairly limited. Practice-wide gains (losses) reflect a general tendency to make (lose) money on most DRGs that the physician admits.

At the medical staff or hospital level, there should be greater opportunities for the averaging principle to work due to the high volume of Medicare cases. Even here, though

- Physician costs are lower in those New Jersey hospitals where the medical staff concentrate their admissions in relatively few DRGs. (There was no effect for North Carolina.)

1.2.4 Geographic Differences in MD-DRGs

Physician DRG payments are about 63 percent higher in New Jersey on average than those in North Carolina, $1018 vs $625. Of course, part of this large cost differential is due to legitimate cost-of-living differences between the two states. The remainder, however, is due to within-DRG differences in specialty mix and service intensity.

- Compared with North Carolina, New Jersey has twice as many cardiologists per capita, 53 percent more internists, and 29 percent fewer GPs. Lower fees for GPs help keep MD-DRG costs down in North Carolina.

The specialty of the attending physician is more important in explaining treatment costs in North Carolina than in New Jersey, apparently because specialty roles are more sharply defined.

- Due to the relatively smaller number of specialists in North Carolina, more triaging is done, and the angina patient who sees a cardiologist is more expensive, and probably sicker, than patients in the same DRG who are treated by a GP. In New Jersey, on the other hand, with its relative abundance of specialists, the specialty lines are blurred. Cardiologists, for example, end up treating a more varied range of patients much like internists do.

The entire style of medical practice is more resource-intensive in New Jersey than in North Carolina. New Jersey physicians use more inputs from other physicians during the hospital stay, regardless of DRG.

- New Jersey surgeons are far more likely to bring in an assistant, with the greatest differential for the easiest operations. New Jersey ophthalmologists use an assistant surgeon in three out of every four lens procedures, while North Carolina ophthalmologists almost never do.

- New Jersey patients in medical DRGs receive more routine visits per admission than do similar patients in North Carolina, primarily because of longer hospital stays.

- Surgical patients in New Jersey receive more visits, both because of longer stays and because nonsurgeons become involved in their care. Apparently, North Carolina surgeons are more likely to provide all routine hospital care themselves, without bringing in a medical specialists.

- New Jersey attending physicians request consultations 2-3 times as often as their North Carolina colleagues.

1.2.5 Who to Pay: Who Wins and Who Loses?

Under the current, fee-for-service reimbursement system, each physician bills, and is paid, separately for his/her services. Who would receive the MD-DRG payment, now that services of multiple physicians are packaged together? Three primary payment models have been identified: (1) direct payment to the attending physician; (2) payment to the medical staff; and (3) payment of a pooled hospital-physician rate, either to the hospital or to a joint venture of the hospital and its medical staff. Who is paid does not necessarily determine how physicians are paid. For example: Medicare could pay physicians directly or pay them indirectly through the medical staff or the hospital and not introduce any essential differences in incentives or behavior if the latter two entities simply "passed through" payments. Similarly, while the entire MD-DRG payment could be made in a lump sum to the attending physician, under an alternative method, the carrier would assume responsibility for paying all other physicians with the attending receiving any residual from the DRG rate.

Who wins and who loses when payment is made to the individual attending physician? Even with an urban-rural differential, the average physician would lose money, $13 per case in New Jersey and $19 in North Carolina, a fairly small amount relative to an average payment of $1,000. Even so,

- There is considerable variation across specialties, ranging from gains of $50-75 per case for GPs and ophthalmologists to average losses of $150-200 on every admission for medical subspecialists, neuro, plastic, and thoracic surgeons.

- Total practice gains (and losses) can be considerable, either because of large per case gains (losses) or because of large Medicare caseloads. Roughly 5 percent of physicians in both states would lose more than $15,000 annually under DRG reimbursement (and almost 2% would incur losses over $25,000). Windfall gains in excess of $15,000 would be realized by almost as many physicians.

Nevertheless,

- There are substantial winners and losers within every specialty. Many specialties who incur net per case losses, such as neurosurgeons, have almost as many winners or losers.

Who wins and who loses when the medical staff as a group receives the MD-DRG paymment? In both states,

- Highly specialized medical staffs are systematic losers. The greater the number of admissions by medical and surgical specialists relative to internists and GPs, the larger the loss per case is at the staff level.

This is offset to some degree, however, for specialized staff in New Jersey teaching hospitals. Medical staffs in New Jersey teaching facilities actually make money on a per case basis.

Finally, we simulated the distributional effects of a pooled hospital-physician DRG payment on joint ventures. There were sharp differences between the two states, suggesting that analysis of a single state would seriously understate redistributive impacts across hospital types. Larger hospitals in New Jersey would be winners. In addition,

- Government hospitals are big losers, holding bedsize and teaching status constant.

- Urban teaching hospitals _per se_ would not be losers unless they were large.

In North Carolina, by contrast,

- Teaching hospitals would uniformly lose although not by as much if they were in an urban area enjoying the higher urban rate.

- For-profit hospitals would also lose, _ceteris paribus_, which is unexpected.

1.2.6 Competitive Effects on Gains and Losses

Why do we observe marked specialty differences in per case gains and losses? Why dces the ophthalmologist and the GP win on average and the thoracic surgeon and the internist lose? More complex cases for the latter two specialties cannot be an explanation, as gains or losses are based on DRG-specific rates. The main reason probably lies in the degree of within-DRG competition among specialties.

- GPs, FPs, internists, and medical subspecialists all admit patients in the same DRGs, and the GPs/FPs are simply less expensive.

- By contrast, ophthalmologists "control" the DPGs they deal with; there is virtually no between-specialty competition in the treatment of eye disorders. Whether an ophthalmologist wins or loses is thus primarily a function of how he/she treats patients relative to other ophthalmologists.

Specialization alone is not sufficient to ensure that surgeons always win; they must also control their area of specialization. Take thoracic surgeons, for example, who currently would lose almost $200 on every case. If they limited themselves to the major heart and lung operations for which they are uniquely trained, their net losses might be smaller or even become gains. Instead, thoracic surgeons perform a fair amount of other, often less complex surgery (e.g., pacemaker implants), for which there is a fair amount of competition, especially from general surgeons. Thus,

- Specialization with concentration is necessary to minimize the negative effects of low-cost competition.

Low-cost competition can arise not only from fee differences across specialties, but also from differences in use of inputs, or practice style. Surgeons admit a fair number of medical cases, and they appear quite cost-competitive with other specialties. For example,

- Internists run a loss on every "medical back problem" they admit, while orthopedic surgeons make money on these cases. Higher costs for internists are due not only to their higher fees, but also to longer hospital stays, and more tests and x-rays.

Does this mean that orthopedic surgeons are more efficient in managing medical back problem cases? Not necessarily,

- An alternative explanation is that there are casemix differences not captured by this DRG, and that internists could be treating a sicker group of patients.

1.2.7 Potential for Cost-Shifting

A special policy concern regarding a DRG payment system for physicians has to do with the opportunities for cost-shifting, or fragmenting the DRG package in order to maximize reimbursement. This can happen in two ways: (1) splitting a hospital stay into two admissions; and (2) performing diagnostic tests that had been included in the DRG rate prior to admission and then billing fee-for-service for these tests. In either case, total physician expenditures would increase. These potential physician responses are particularly critical, because hospitals share the same incentives under the new PPS legislation. Our physician DRGs can provide baseline data on the extent and nature of readmissions and ambulatory testing prior to PPS.

There is already considerable readmission activity:

- One out of every five Medicare patients admitted to the hospital in 1982 was readmitted one or more times in that same year. These patients account for one-half of all Medicare admissions and one-half of all physician expenditures in the hospital setting.

On the surface, relatively few readmissions are clearly related to the initial admission, suggesting that detecting inappropriate patterns of admission under PPS may be difficult.

- Two-thirds of patients are readmitted into a different MDC from the first admission. There are few instances (less than 5%) of potentially split surgical admissions, i.e., where both initial and subsequent admissions involved major surgery in the same MDC.

Monitoring premature discharge and readmission rates may also be difficult because of their sheer number.

- About 14 percent of readmissions occurred within the first seven days after discharge.

By contrast, there is relatively little ambulatory activity in the sven days immediately before and after hospitalization.

- Pre and posthospitalization costs are small relative to physician hospital costs -- generally less than 5 percent for surgical DRGs and 10-15 percent for medical DRGs. When pre and post costs are added to physician costs in the hospital, CVs for most DRGs remain largely unaffected.

These results suggest that the DRG payment could be expanded to cover this two-week period without a substantial increase in the payment level. Thus,

- For a relatively small dollar amount, policymakers could purchase protection against (potentially very large) cost-shifting into the outpatient setting.

1.3 Organization of Report

The report consists of eight additional chapters plus appendices. Chapter 2 presents a theoretical discussion of the hospital-physician relationship and analyzes the incentives inherent in alternative payment modes. Chapter 3 describes how physician DRGs were constructed from Medicare claims. The empirical analyses begins in Chapter 4 with a presentation of MD-DRGs for the first time and an assessment of their ability to explain costs. Chapter 5 then decomposes MD-DRGs, looking at the physician inputs associated with them and comparing treatment patterns across specialties and across states. Simulation of winners and losers under DRG-based reimbursement is performed in two chapters; Chapter 6 analyzes the distributional effects of MD-DRGs on attending physicians and Chapter 7 analyzes their effects on medical staffs and hospitals. The final two chapters are devoted to the potential for cost-shifting. Chapter 8 explores readmission patterns while Chapter 9 investigates physician utilization prior to hospitalization and after discharge. Average payment levels for all 468 hospital and MD-DRGs can be found in Appendix A. DRG cost weights and mean lengths of stay by DRG are displayed in Appendix B.

2.0 METHODS AND INCENTIVES IN ALTERNATIVE PHYSICIAN DRG PAYMENT MODES

2.1 Introduction

2.1.1 What is a Physician DRG?

Under P.L. 98-21, the DHHS secretary was asked to report to Congress on "the advisability and feasibility of providing for determining the amount of the payments for physicians' services furnished to hospital inpatients based on the DRG type classification of the discharges of those inpatients". Since then, "physician DRGs" or "MD-DRGs" have gained considerable attention as an option for physician payment reform. But exactly what is a physician DRG? To a certain extent, MD-DRG is a misnomer for it implies that a casemix classification system was developed expressly for physicians. Rather, what is usually meant by MD-DRG is a prospective reimbursement system for inpatient physician services much like that currently used by Medicare for inpatient hospital care: a fixed case payment per hospital admission, where the size of the payment is determined by the patient's DRG. Under this approach, all services performed by physicians and normally billed as Part B services would be combined in a single bill and a single payment made.

Physician DRGs are an example of "packaging", of redefining the physician payment unit from a narrow procedure to a more comprehensive bundle of services. Surgeons have traditionally been reimbursed on a package basis, receiving a single payment for both the operation itself and normal post-operative care. Physician DRGs go a step further by packaging all other services provided during the hospitalization, such as anesthesia, x-rays, and consultations.

The major advantage to an approach like MD-DRGs is that it encourages the physician to take a broader view of the patient care process, with incentives to cut back on marginal procedures. The decision to order a diagnostic test or bring in a consultant is no longer costless to the physician, since their costs must come out of the fixed case payment. As with any packaging approach, of course, there is always the concern that the physician may order too few services and thereby jeopardize quality of care. How physicians would respond under a MD-DRG system will depend in large part on how and to whom the case payment is actually made.

2.1.2 Overview of Chapter

This chapter makes a conceptual link between what is currently known about the physician-hospital relationship and the way physicians might respond to alternative methods of DRG payment. Just categorizing the various payment modes in a way conducive to behavioral analysis is a challenging task, for the variations seem infinite. As each nuance in a method can dramatically alter incentives, it is important to be as specific as possible. Predicting responses then becomes a matter of laying out the incentive structure implicit in each method, and describing how physicians might react to this structure. The last requires a model of physician medical-economic decision-making and the underlying physician-hospital relationship.

The chapter is organized as follows. Section 2.2 provides a general model of physician-hospital utility maximization. How the current PPS has altered the relationship between physicians and hospitals is also discussed. Section 2.3 then describes the several payment options currently being considered in academic and policy arenas. In Section 2.4 inferences are then drawn by method for physician and hospital behavior along two dimensions:

(1) physician and nonphysician relationships; and

(2) hospital use (LOS, admission and readmission rates, transfers).

2.2 Physician-Hospital Relationship and PPS

According to Detsky-Harris-Pauly,* hospitals have four kinds of managers: the board of trustees; staff physicians; ancillary supervisors (including nursing); and hospital administrators. While all share in common the survival of the institution, they diverge in how committed they are to its longevity vis-a-vis more immediate goals. For physicians, maximizing net income per hour worked in the hospital along with research and prestige goals are probably dominant whereas hospital administrators are more interested in overall hospital growth and financial status.

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*Our model is a synthesis of work found in Detsky (1978), Harris (1977), and Pauly (1980).

This situation is quite different elsewhere in the economy. Managers and employees in for-profit firms have disparate goals, too, but market survival necessitates cost-minimizing behavior -- at least in the long run. In voluntary hospitals, the absence of an external market cost-minimizing necessity mitigates administrative pressures on physicians to practice in cost effective ways. Physicians themselves have no such incentives. If anything, they treat all other hospital inputs as (nearly) free goods, substituting and/or complementing their own activities. They have an incentive to admit in order to generate demand for their specialized services (e.g., surgery) as well as to substitute nursing, resident, and other medical inputs for their own time.

Moreover, as Detsky-Harris argue, both physicians and administrators have abhorred underutilization of beds and equipment and seek to use services as fully as possible. Administrators do so from a strict revenue concern. Physicians, they argue, demand hospital services as part of a queueing process. Excess supply encourages utilization to avoid possible access delays later in the course of care. Observed low occupancy rates and underutilized services reflect either short-run disequilibrium due to overexpansion or institutional constraints imposed by PSROs.

The introduction of PPS for hospitals has clearly driven a wedge between this coincidence of interests in certain respects. Hospital payment is now tied only to the discharge which in turn depends on admission rates. Use of ancillary services no longer generates additional revenue to the hospital, but does raise variable costs. By contrast, physician incentives have not changed, and the incentives to hospitalize and to use ancillaries remain. Thus, the physician's original hospitalization incentive is now reinforced by the hospital's financial imperative to admit, but ancillary incentives become antithetic.

For the first time, market financial survival may lead hospital administrators, supported by the board, to institute an ancillary control system. How successful it will be is arguable. Detsky (1978, p. 11), among others, raises serious doubts about external cost control methods like higher copays and rate regulation because they fail to internalize the physician in the process. In all other firms, the primary resource decision-maker is

directly salaried by the institution. Such is not the case in most hospitals. Control over physicians, except those under contract, is indirect and relatively limited to extending privileges. To be successful, control needs to be more direct, or physicians must face similar incentives under a revised payment scheme. Physician DRGs provide a method to accomplish the task, depending in a critical way on who is paid.

2.3 Physician DRG Payment Models

Given this conceptual understanding of the physician-hospital relationship as background, this section considers the likely responses of physicians to introducing "physician DRG" payment. In theory, the packaging of physician services into a global fixed rate should raise the implicit cost of using multiple physicians in patient care, resulting in less input use. But because how physicians will be paid is at least as important as the bundling aspects of DRGs, we consider several payment models currently under consideration (Jencks and Dobson, 1984). We have organized them under three headings: (1) direct physician payment; (2) payment to (or control by) the medical staff; or (3) payment to the hospital.

It is important to note at the outset that the locus of payment and the incentive structure put into place are not necessarily the same. Who is paid does not determine *ipso facto* how physicians are paid. That is to say, Medicare could pay physicians directly or pay them indirectly through the medical staff or the hospital and not introduce any essential differences in incentives or behavior if the latter two entities simply "passed through" payments. It is quite reasonable to expect the medical staff in particular to engage in pass-throughs. The following discussion, to be complete, mentions several payment variations across locus which are basically the same as far as individual physicians are concerned. As these do not reflect unique characteristics of the "Medical Staff" or "Hospital" models, the presumption is made that alternative, truly different, modes are adopted, either immediately to accomplish certain goals or retrospectively in response to perverse responses.

2.3.1 Direct Physician Payment

Three major alternatives exist for paying physicians directly. The first we call Attending Lump-sum payment; the second Absolute Residual; and the third, Pro Rata Residual. All are predicated on establishing a global rate, or ceiling, based on average, actuarial physician charges per DRG in a locality (e.g., carrier area, region), then arranging disbursements either *in toto* to the attending physician or itemized to each physician in a *pro rata* manner. Table 2-1 provides summary descriptions of each method.

(1) Attending Lump-sum Payment

Under this disbursement method, the actuarial average physician DRG rate would be paid in a lump-sum directly to the attending physician of record (usually the one signing the hospital discharge sheet). The attending would then be responsible for all disbursements to other physicians. This method presumes that the attending plays a case manager role in the patient's care, either performing or recommending all medical, surgical, and diagnostic services, and is thus responsible for all physician bills.

(2) Absolute Residual

Under this method, the carrier takes over the administrative responsibility of paying all other physicians, with the attending physician receiving any residual from the DRG rate. This method can accomplish essentially the same goals as paying the lump-sum total to the attending physician while taking over the disbursement burden. Furthermore, by the carrier paying each physician directly, the financial subordination of other physicians to the attending is less apparent, reducing friction among physicians.

Three variations are possible: (a) *no* screens at all on non-attending physician bills; (b) *total charge screens*; or (c) *screens just on fees per service*. Variation (a) is straightforward and devolves into a pure residual method. Under (b), the carrier could screen each type of physician service

TABLE 2-1

TAXONOMY OF PHYSICIAN DRG PAYMENT MODES

Payment Modes	Description
Direct Physician	
(1) Attending Lump-Sum	Lump-sum payment to single attending physician who is responsible for paying all other non-hospital physicians.
(2) Absolute Residual	Carrier makes residual disbursement to attending physicians after all other physicians are paid Carrier may use no screens by physician service, screens on total charges when present, or screens only on fees per unit.
(3) Pro Rata Residual	Disbursements to physicians made by carrier based on submitted bills with excesses from DRG rate resulting in pro rata reductions in each bill and shortfalls resulting in pro rata increases in all physicians' billings. Carrier may or may not use fee screens.
Medical Staff	
(4) IPA Pro Rata	Carrier arranges disbursements to a hospital's eligible medical staff based on individual bills. If accumulated bills from Medical Staff exceed DRG aggregate allowed payments, all bills are proportionately reduced by staff-wide adjustment factor. Carrier may use fee screens in calculating distribution.
(5) Bonus IPA Pro Rata	Same as IPA Pro Rata except that a bonus pool as a percent of DRG allowables is set to reward physicians with below average bills.
(6) Unique	Medical staff decides on own disbursement algorithm with special incentives and penalties.
(7) Combined (A+B)IPA	Carrier pays Medical Staff an actuarial amount to cover both the hospital and physician component of the DRG. The staff is then responsible for negotiating a method of payment with the hospital.
Hospital	
(8) Salary	Carrier pays total hospital and physician DRG average to the hospital. The hospital simply contracts with all physicians on a straight salary basis.
(9) FFS Pro Rata	Hospital signs fee-for-service contracts with all staff physicians which are used as a basis for physician payments. Like IPA Pro Rata, excess charges are pro rated downwards; shortfalls upwards.
(10) FFS Pro Rata Bonus	Same as FFS Pro Rata except that hospital reserves a bonus pool to reward physicians achieving hospital goals of shorter stays, more admissions, and fewer ancillaries.
(11) Combined (A+B) MeSH	Hospital and medical staff legally form a joint venture (called a MeSH) to administer the hospital and disburse all revenues. Carrier would pay a combined payment to the MeSH which would be responsible for establishing a physician payment method.

against the average total charges when present,* limiting payments by service category (e.g., a $200 maximum radiologist allowable for x-rays). Screening total charges by service type would limit the risk of the attending physician by placing the risk of excess services on consulting physicians. For example if the radiologist performed 4 x-rays at $20 each when only 2 were usually done, he/she would be paid $40, not $80, and would have to absorb the cost of the extra x-rays. Under (c), if the carrier screened only unit fees and not total charges by service, then the risk of excess services, but not "overcharging", is put back on the attending physician as case manager.

(3) Pro Rata Residual Payment

Under the Pro Rata Residual method, DRG payment would be made to each physician submitting a bill for a given patient on a pro rata basis, not just the attending. It differs from Absolute Residual in that complementary physicians share in any gains or losses from payment.

The Pro Rata Residual method could work in the following manner. Assume that total physician inpatient charges for a lens procedure averaged $1,350. This would become the rate to be disbursed for all discharges in this category. For a given discharge, further assume the following submitted bills (col. 1):

	Bills	DRG Average	ADJ1 (1350/1475)	ADJ2 (1350/1225)	PAY1 (ADJ1)	PAY2 (ADJ2)
Head Surgeon (attending)	$1,250	$1,000	.915	1.102	$1,144	$1,102
Assistant Surgeon	0	100	.915	1.102	0	0
Anesthesiologist	200	200	.915	1.102	183	220
Routine Visits	25	50	.915	1.102	23	28
TOTAL (Adj. Total)	$1,475 (1,225)	$1,350			$1,350	$1,350

*It only makes sense to use total charge screens when a particular type of service is billed rather than actuarial averages because actuarials include a likelihood-of-service weighting. For example, it makes no sense to pay an assistant surgeon $100 if he submits a $200 bill simply because assistants are used only half the time on average. Presumably, the head surgeon has asked the assistant to participate and thus should be liable at least for the average total charge for this service.

The designated attending physician in this case is the head surgeon, although this would not have to be the case. He/she has submitted a bill of $1,250; no assistant surgeon was used; the anesthesiologist billed $200; and the patient's family physician billed $25 for routine inpatient visits. The total comes to $1,475, or $125 above the allowed rate (see col. 2). The head surgeon has billed $250 more than average, but saved $100 (relative to the average) by not using an assistant. He/she also "saved" $25 on routine visits.

Two pro rata adjustment methods seem reasonable to consider:* (a) simple pro rating; and (b) pro rating with fee screens. Under the first method, all submitted bills are pro rated, or rescaled, to the actuarial DRG average, $1,350. In our example, this requires multiplying all bills by the ratio, ADJI = $1,350/$1,475 = .915, producing payment schedule, PAY1. Adjusting only for the $1,350 limit, the head surgeon would receive $1,144; the anesthesiologist, $183; and the family physician performing routine visits, $23. The head surgeon would enjoy $144 more than the $1,000 average for his/her service, but $106 less than the $1,250 bill he/she submitted. This extra amount would come primarily from not using an assistant surgeon ($100) with $17 (=$200-183) from the anesthesiologist and another $27 from lower routine visit charges. The anesthesiologist would receive only $183, not the full $200 average, even though his/her bill conforms to the average charge for this service. Even more punitive given his low charges to begin with is the $2(=$25-23) discount on the family physician's charges. This anomaly is due to "overcharging" by the head surgeon.

In the second adjustment for overcharging, the surgeon's charge would be scaled back to the average $1,000 charge for his/her component of the DRG, producing an adjusted total bill ($1,225) and a new adjustment factor (ADJ2 = 1.102) and a new schedule of payments, PAY2. ADJ2 would apply to the surgeon's constrained, $1,000 limit, and to the unconstrained bills of other

*A third method would apply the pro rata adjustment to individually submitted bills with a service-specific limit. Thus, if ADJ1($1,350/$1,475)=.915, each physician's charges would be scaled down by this amount, then further constrained to the component's actuarial average. Under this method, no physician, including the attending, could "win", but several could lose, robbing the method of positive efficiency incentives. If the pro rata screens were applied only to non-attending physicians, the method would devolve into the Absolute Residual method with total charge screens.

physicians. The head surgeon receives only $102 more than the average while the anesthesiologist and the family physician also share in the savings from not using an assistant surgeon ($20 extra for the anesthesiologist; $3 for the regular physician). Because the head surgeon's allowable of $1,000 is 81.6 percent of the $1,225 adjusted total bill, he/she receives $102 of the $125 in total savings from not using an assistant or incurring routine visit costs.

Thus, under Pro Rata Residual, the attending's share of any savings on other physicians is shared with his/her colleagues and can result in very different allocations than lump-sum or absolute residual methods. In our example, the head surgeon would have received $125 less than his/her full charge ($1,125 = $1,350-$200-$25) under either the lump-sum or absolute residual method. This is a bigger discount than under simple *pro rating* but a smaller one than under screened *pro rating*.

What if the surgeon had only billed $800 instead? Total bills would have been $1,025, ADJ1 = ADJ2 = $1,350/1,025 = 1.317, and his/her payment would have been $1,054, or $254 more than actually billed. This is still much less than under Lump-sum or Absolute Residual, however. The anesthesiologist's payment would also rise to $264 due to the surgeon's lower billing rate as well as the absence of an assistant surgeon; the family physician's payment would rise to $33. Where attendings (or any other physicians) charge less than the DRG average, all other physicians share in the economy.

What if the anesthesiologist had billed $300 instead of $200 with all other bills originally unchanged? The adjusted total bill would be $1,225 ($1,000 + $200 + $25), ADJ2 = 1.102, and payments would be $1,102, $220, and $28 as in PAY2. Here, the anesthesiologist receives $20 more than the DRG limit for his/her services, but not because of overcharging. Rather, the $20 bonus again comes from the head surgeon not using an assistant surgeon and incurring only one-half the average routine visit costs. The anesthesiologist is neither penalized nor rewarded for overcharging.

Finally, note that where the surgeon used no other inputs (obviously impossible unless the anesthesiologist is salaried by the hospital), the effect of the *pro rata* adjustment is to guarantee the surgeon $1,350, which seems appropriate.

2.3.2 Paying the Medical Staff

Next, consider four ways in which carriers could pay the medical staff as an entity although the first (IPA Pro Rata) effectively becomes a version of the Pro Rata Residual method if a case-specific adjustment factor is used for disbursement.

(4) IPA Pro Rata Payment

Under this method, each hospital's medical staff would be treated much like an IPA with individual physician billings accumulated in separate accounts by the carrier. A total "Medical Staff" account would also be credited based on the actuarial value of each physician DRG, e.g., $1,350 per lens procedure, adjusted for copays. Periodic disbursements from the total staff account would be made to individual physicians based on either (a) actual billings as with an IPA, or (b) number of services. Where total medical staff credits deviated from the sum of individual accounts, disbursements would first be pro-rated. For example, if actual total billings were $100,000 based on 100 discharges and allowed physician DRG charges for these patients were $90,000, then each physician's payment would be reduced 10 percent. If actual billings were only $80,000, then disbursements would be adjusted upwards by one-eighth.

Because individual physicians would have incentives to set arbitrarily high charges to maximize their share, each physician's billings could first be adjusted to reflect average unit prices. A $1,250 bill from a surgeon performing a lens procedure, to use the previous example, could be capped at the $1,000 average, then included in the proportional distribution formula.*

What distinguishes this Medical Staff IPA Pro Rata from a Direct Physician Pro Rata Residual method is that periodic payment is now made to each physician based on a staff-wide pro rata adjustment factor rather than one

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*This could also be accomplished to a first approximation if the carrier continued to screen individual charges and applying the prevailing limit as an upward bound. A drawback to this is the maintenance of CPR data reporting and statistical manipulation which is very costly.

that varies with each admission. Hence, it would be possible for physicians involved only marginally in a given case to receive less than the DRG actuarial average if the average, staff-wide adjustment factor were less than 1.0. It would also be possible for physicians involved very intensively in a case to be scaled down far less than necessary to stay within the DRG payment. The net effect is to pool risk for intensive cases across the entire medical staff; inevitably, it also pools the costs of those attendings unwilling to act as prudent case managers.

(5) IPA Pro Rata Bonus

A more typical IPA method would hold back a small percentage of DRG payments to produce a bonus pool. (No losses pool *per se* would be necessary if all carrier payments were immediately scaled to actuarial DRG rates.) The medical staff presumably would allocate bonuses based on individual physician contribution to the overall staff goal of cost control, *viz.*, staying within the DRG allowables. Thus, attending physicians whose aggregate DRG physician bills were less than allowed payments would enjoy a share of the bonus pool, say, proportionate to their number of admissions.

For example, assume a 5 percent bonus pool on 1,000 admissions that resulted in $2 million in allowed payments. The pool would amount to $100,000. If one physician were responsible for 10 percent of the "below cost" admissions, he/she could receive $10,000 extra at period's end. All physicians would have their initial payments reduced by 5 percent in order to pay for these bonuses.

(6) Unique Payment

A third alternative would permit each hospital's medical staff to propose its own allocation algorithm to the carrier, either that or actually take control of the periodic disbursements. This could permit more flexibility in rewarding or penalizing certain members of the staff. It would also put the staff in a more personal, contentious position in determining "winners" and "losers".

(7) Combined Physician-Hospital Payment

Medicare could go a large step further and pay the medical staff for both the physician and the hospital care in one lump-sum. The staff in turn would disburse payments to their hospitals according to a predetermined arrangement.* Paying the staff, rather than individual physicians, allows them as a group to pool risks of long, complicated stays, assuming they negotiated a per diem rate. They would still be at risk for more intensive (per day) and/or extensive (longer stays) care.

2.3.3 Paying the Hospital

A third possibility would involve paying the allowable physician DRG amount to the hospital on a periodic basis rather than directly to physicians or the medical staff. This would be the converse of the previous option (7). To be different, its distribution would have to be under the control of hospital administration; otherwise it would devolve into one of the two previous general methods.**

This method would likely result in either an all-salary mode or individual contracting with physicians along the lines hospitals do now with radiologists, pathologists, anesthesiologists, cardiologists, neurologists, etc. In the past these contracts have been either a straightforward salary or

*We have not considered such a financial arrangement at the individual physician level because of the administrative burden involved and the financial risk to physicians. Given the hospital's almost complete lack of control over inpatient care, it seems highly unlikely they would be willing to agree to per case rates which put it at risk for long stays. On the hospital side, they would have to negotiate per diem payment rates with each admitting physician. On the physician side, they would be open to enormous losses for complicated, long-stay patients unless total admission rates were negotiated.

**It could anyway if the hospital chose to use, say, a Medical Staff IPA approach, but this is unlikely given asymmetric interests arising from hospitals' desires to reduce ancillary use and at least some physicians' desires to maintain it.

some percent of gross or net department billings. The pendulum has swung towards fee-for-service contracts, essentially giving the physician a franchise right to bill patients in turn for treating all patients in the hospital--at least for a specified set of hours.

(8) Salary

Hospitals could simply put all staff physicians on salary. This reproduces the traditional hospital HMO model with its unique incentive structure.

(9) Fee-for-Service Pro Rata Payment

Fee-for-service contracting, on the other hand, could be analogous to pro rata payment except that physicians bill the hospital at negotiated rates and the hospital receives the actuarial DRG rate which it then distributes to individual physicians in pro rata amounts based on relative billings. Because this is no different than direct physician pro rata residual, it is of little interest. The hospital is simply taking over the disbursement burden of the carrier.

A material difference could arise if the fees per service negotiated with physicians deviated from average fees. This could result in different allocation percentages by, say, specialty where negotiated fees are more-or-less marked down from the average. It could also produce extra profits for the hospital.

(10) Fee-for-Service Pro Rata Bonus Payment

Going a step further, bonus pools could be set aside to reward physicians who reduced hospital costs through shorter stays and less ancillary use. In this sense the pool would differ from that established for the Medical Staff model. Allocations presumably would be based not on "physician savings" but "hospital savings". For some decisions, the resulting incentive pool would affect both in the same direction, e.g., shorter stays. Others, however, could result in a substitution of hospital for physician inputs, e.g., nursing, leading to a different set of "winning" physicians.

For example, a hospital could determine that the average institutional cost of treating a particular DRG was $3,000 on a five day average stay. If the physician discharged a patient in four days, he/she could be eligible for, say, a 50 percent sharing of the $600 saved (ignoring marginal costs below average costs). This might be offset to some degree by greater ancillary intensity.

(11) Combined Hospital-Physician Payment

There is yet another alternative receiving serious consideration, called the MeSH, or Medical Staff Hospital joint venture (Ellwood, 1983; LaViolette, 1983). This involves the hospital administration and medical staff forming a separate legal corporation to jointly manage the institution, with physicians having an explicit vote in hospital policy and a financial risk in its success or failure. Such a structure would greatly simplify Medicare's arrangements by delegating payment to a single entity, the MeSH. How this entity would then disburse physician payments is still of considerable interest given the effects that payment has on admissions rates, length of stay, and ancillary intensity. Most of the likely options have already been discussed, with Hospital Fee-for-service Pro Rata Bonus Payment particularly germane.

2.4 Incentives Under Alternative Payment Modes

2.4.1 Direct Physician Payment Modes

The attending lump-sum and absolute residual payment methods would engender similar incentives regarding physician and hospital use (see Table 2-2). The attending physician in either case would have strong incentives to reduce inpatient physician consultations and to use hospital employees more as a free good substituting for their own time. (Hospital employees include not only nursing staff, but internists and residents, as well as any salaried physicians such as pathologists.) This could raise hospital costs per day (and possibly per admission). The effect on admissions rates is unclear. "Low cost" attendings would have incentives to admit more patients while "high cost" attendings would be encouraged not to take responsibility for admitting more serious cases (unless they changed their practice mode). Assuming all

TABLE 2-2

INCENTIVES FOR PHYSICIAN AND HOSPITAL UTILIZATION UNDER ALTERNATIVE PAYMENT MODES

	MD/NON-MD USE		HOSPITAL USE		
	Physician Consultants	Hospital Employees	Admission Rate	Length of Stay	Ancillaries
Direct Physician					
(1) Attending Lump-Sum	-	+	?	-	-
(2) Absolute Residual	-	+	?	-	-
(3) Pro Rata Residual	-	+	?	-	-
Medical Staff					
(4) IPA Pro Rata	-	+	?	-	-
(5) IPA Pro Rata Bonus	-	+	?	-	-
(6) Unique	-	+	?	-	-
(7) Combined (A+B) IPA	-	-	+	-	-
Hospital					
(8) Salary	+	+	-	-	+
(9) FFS Pro Rata	-	+	?	-	-
(10) FFS Pro Rata Bonus	-	-	+	-	-
(11) Combined (A+B) Method	Incentives depend on allocation method				

complicated cases eventually receive hospital care, the improved profitability of low cost cases would likely result in overall higher admissions rates.

Length of stay and ancillary, physician-related, services per admission would fall, although this depends on the DRG production function. If more ancillary care significantly shortened stays, the savings of physician inputs on an extensive basis (i.e., per admission) could more than offset those provided intensively (i.e., per day). This may be especially true in the East and North Central regions where lengths of stay are very long.

Non-attending physicians, however, would have every incentive to maximize charges and ancillary use if called in on a case, for if they generated costs less than the maximum DRG allowable, any savings would go to the attending. It is unknown how successful attending physicians could be in controlling utilization under this pressure. While not a problem for DRG payment in the short-run, this perverse incentive could inflate the rates upon recalibration in the long run.

Incentives to conserve on physician inputs under the Pro Rata Residual method are more complicated. As described in Section 2.4.1 (4), all physicians involved in a case would share in any savings or losses. Thus, the attending still has a strong incentive not to use certain types of inputs, e.g., assistant surgeon, cardiologist, but it is attenuated by proportional sharing among his/her colleagues on a case. Whereas under the absolute residual method a dollar saved on, say, radiology, is a dollar of extra income, the same is not true when pro rated across remaining physicians. (Remember the anesthesiologist who received $20 more than he/she charged as his/her share of the savings from not using an assistant surgeon.) Thus, pro rata residual incentives to conserve on other physician services are not as strong as under lump-sum or absolute residual payment. Similar conclusions obtain regarding other physician cost-saving decisions, e.g., LOS and ancillaries.

It is also interesting that under pro rata residual the attending physician has an asymmetric incentive to either use no other physicians or to include several others. In the former situation, the attending keeps the entire DRG payment, avoiding any sharing. This happens very rarely in hospital care, however. More likely is the case where two or more physicians are involved. Under this scenario, additional costs of another consultant are pro-rated across those already involved. Thus, the $200 assistant surgeon may cost the head surgeon only $150 after pro-rating the extra costs across the

anesthesiologist and radiologist. The incentive remains not to use an assistant, but it is not as strong as under the first two methods.

The incentive to conserve on other physician inputs completely disappears when charges for each service equal or exceed the DRG average. Each physician will receive the ceiling allowance, no more no less. The attending physician, therefore, can once again treat additional physician input as a free good, with non- attendings bearing the risk of extra utilization.

Physician direct payment modes raise many serious questions above-and-beyond any financial considerations. First, the lump-sum and absolute residual methods put attendings, consultants, and other physicians, like radiologists, at odds. Attendings do not always want to negotiate fees with their colleagues or monitor their performance. Nor is it clear that a single attending always has total control of a patient's care during a lengthy admission. Once "turning the specialists loose," it may be impossible to control the extent of their activities, either due to lack of specialized knowledge or for more personal reasons. Expecting the attending physician to act as an omnipotent, omniscient case manager may be unrealistic. The pro rata residual method is somewhat better in this regard as all participating physicians share in any cost savings and should not feel as compelled to run up large bills for their services.

Another problem with implicitly raising the price of physician services to individual attendings is that it can erode the physician-patient relationship, a relationship built in no small part on treating other medical input prices as exogenous.

> "Patients want their physicians to focus only on the problem of their health, not on questions of cost. The prices the doctor faces must appear to be arms-length prices." (Detsky, 1978, p. 102)

Direct physician payment methods may raise suspicions in patient's minds of skimping on specialists, etc. which can be counterproductive. It may also be unrealistic to expect attendings to bear the full burden as society's agent -- particularly when it comes to acute care situations. It is one thing for society to criticize physicians for letting financial interests sway decisions in favor of more care; it is quite another for patients to believe, however wrongly, that their own physician is making money by not using other physician services.

2.4.2 Medical Staff Payment Methods

Under a simple IPA Pro Rata payment to the medical staff, the use of a staff-wide adjustment factor results in uniform reductions in bills (unless additional, procedure-specific fee screens are used which is likely). The staff as a group therefore has incentives to keep physician charges down, but not individual attendings. An attending physician incurring twice the DRG average would be scaled down only to the staff-wide average. Under a staff-wide pro rata method, attendings would have little incentive to use consultants more sparingly because their cost would be shared across the entire staff. Admittedly, the incentive would still be negative relative to the current system (after all they would share, say, 1/100 of total staff costs) but highly attenuated.

This "tragedy of the commons" is the fatal flaw in simple IPA arrangements, a flaw that has been addressed through a bonus system tied explicitly to overall staff goals. If low cost physicians were given bonuses tied to less physician use, then the obverse of the simple IPA incentive arrangement occurs; that is, the high cost physicians contribute to the bonuses without sharing in them. The carrot of lump-sum payments for conservative physician use should result in substantial reductions in consultations and ancillary physician services, how much depending on the size and distribution of the bonus percentage. If a 5 percent pool were spread across many low-cost physicians, it may amount to less additional income per physician than if they had been paid directly an average lump-sum upon discharge. If spread across only a few, on the other hand, the 5 percent pool could vastly exceed any aggregate lump-sum residual to a single physician, and hence result in even more powerful incentives to conserve. For example, physicians may know beforehand that roughly $100,000 (5% of $2 million in allowable payments) will be divided among physicians on a pro rata basis only for below-average-cost admissions. If only a few physicians ever qualify for the pool, the returns would be great while if all reduce their costs dramatically, the pro rated returns would be disappointing. Of course, the 5 percent pool could also be expanded if total billings actually fell short of payment.

That bonus pools could result in severe reductions in physician use presents an interesting problem to the medical staff, one that could eventually lead to a "unique" allocative method. Dynamic competition among

attendings to lower costs per case could reduce overall medical staff incomes to a point unacceptable to the majority of physicians. Non-attending specialists, such as radiologists and anesthesiologists, would be most affected, but the consulting income of other attendings could also suffer through fewer referrals. Exit of high cost attendings, consultants, and hospital-based fee-for-service physicians, furthermore, could threaten the quality of care, having negative side-effects on a hospital's demand. A stable equilibrium could naturally arise as the result of staff turnover, but it is more likely that revised disbursement algorithms protecting disgruntled groups would be voted in beforehand. This could arrest any cost saving measures of attendings -- possibly depriving physician DRGs of nearly all of their potential.

A combined Part A plus Part B payment to the medical staff allows physicians more alternatives to recoup losses due to excess use of physicians alone. Incentives to cut hospital costs through shorter stays would be reinforced when the hospital payment is also made to the medical staff. Because these savings generally dominate physician bills and have not been shared by the staff heretofore, most of the change should come at the institutional level with less need to reduce complementary physician input. It also seems clear that overall admissions should rise given the extra financial incentives physicians would have -- assuming, of course, that lengths of stay and ancillary costs would fall enough to make them profitable.

Lengths of stay should be particularly sensitive to this combined mode given the potential dollars involved. How attendings would treat the hospital employees, such as nurses, is less clear, but physicians would have a greater incentive to conserve on hospital inputs than under the separate IPA payment modes. This incentive, according to Pauly (1980), would be inversely proportional to the size of the medical staff, as any cost savings on the institutional side would be shared by all physicians unless a special bonus arrangement were established -- a possibility considered in the next section.

2.4.3 Hospital Payment Methods

If payment to the hospital for physicians' services resulted in all medical staff being salaried, an unlikely but conceivable arrangement in some cases, then an HMO incentive structure arises. Under a fixed payment per week or month, physicians would have no incentive to refrain from using other

consultants or hospital staff, nor would they have any particular incentive to admit or cut back on "free" ancillaries. On the other hand, they would no longer gain from longer stays, which should shorten somewhat.

The principal advantage to the hospital in salarying physicians is the financial control they would have. High cost physicians could be ordered to change their practice behavior or be dismissed, while the number of specialists could be limited. The big area of HMO savings, i.e., reduced admissions, would not be achieved under this mode, basically because Medicare is paying the hospital only when a beneficiary is admitted. Within-hospital HMO savings due to efficient practice are relatively minor (Luft, 1981).

Other payment modes, however, may be more successful in achieving hospital goals while being more palatable to physicians. In particular, the hospital could sign physician fee-for-service _pro rata_ contracts with bonuses for more admissions, shorter stays, etc. These contracts would not discourage work effort while avoiding the perverse incentives of a fixed salary. The effect of the bonuses would reinforce incentives in a physician DRG system to shorten stays and reduce ancillary use. Unfortunately, it would also encourage admissions, which is in the hospital's interest but undesirable from a societal perspective. This coincidence of interests would be a serious concern to policy makers.

The last method, the MeSH, is a compromise between paying either the hospital or the medical staff the combined Part A and B DRG payment. Physicians would become partners in the management of inpatient care, likely enjoying partnership shares. In other firms these shares are a combination of base salaries plus year-end bonuses based on billings, seniority, and contributions to partnership goals, _inter alia_. Any base salary might be hard to determine for the original medical staff that works in the hospital only sporadically depending on patient needs. Bonuses therefore would likely play a much larger role than if all physicians were fulltime employees.

Heavy reliance on bonuses would devolve into a fee-for-service _pro rata_ bonus system except that physicians would have a much larger say in the allocation mechanism. Emphasis on shorter stays and reducing institutional costs would probably be less, although still considerable even compared to the current PPS incentive.

3.0 METHODS

3.1 Data Sources

Our empirical analysis of physician DRGs rests primarily on two data bases: Medicare Part A and Part B claims for New Jersey and North Carolina. The analysis is based on all Medicare hospital admissions in these two states for the 1982 calendar year. These data include both aged and disabled enrollees.

The ability to merge hospital and physician claims at the patient level provides us with a unique data base. There are several disadvantages to using either hospital or physician claims alone for in-depth analysis of physician DRGs. First, Part A claims lack the procedural detail necessary to completely classify admissions into DRGs (Pettengill and Vertrees, 1982).* Second, they do not provide information on physician utilization and charges. Third, hospital claims obviously include no data on pre- and post-hospital utilization. Physician claims provide all of these missing data elements. They are limited, however, as a sole data source. Most important, they do not include physician services paid directly to the hospital. Thus, physician charges for certain key specialty groups, such as radiology, anesthesiology and pathology, would be underestimated. The magnitude of the underestimate varies systematically by hospital (as hospitals vary in their contracting arrangements with physicians).

The task of merging physician claims to a hospital admission proved to be monumental, but definitely feasible. For every hospital claim, there was an average of 10 physician bills related directly to that hospitalization. We developed a number of algorithms for aggregating these multiple physician bills up to the patient (or admission) level. This required considerable sorting and merging through hundreds of thousands of claims.

The various sources for these claims are shown in Table 3-1. Prudential Insurance Company is the Part B carrier for both states. Prudential is also the Part A intermediary for approximately one-fourth of the New Jersey

*Beginning January 1, 1983, hospitals are required to report secondary diagnoses and additional surgical procedures, so this detail will be available in the future.

hospitals, while Blue Cross of New Jersey is the intermediary for the remaining hospitals. Blue Cross of North Carolina is the Part A intermediary for that state. The presence of multiple fiscal agents, each with its own medical procedure coding and claims processing systems, made creating compatible patient records that much more difficult.

TABLE 3-1

CLAIMS DATA SOURCES FOR PHYSICIAN DRG PAYMENTS

	Part A Inpatient	Part B	Part A Outpatient
New Jersey	Blue Cross of NJ Prudential	Prudential	Blue Cross of NJ Prudential
North Carolina	Blue Cross of NC	Prudential	Blue Cross of NC

We began with over 280,000 Medicare hospital claims in North Carolina and approximately 313,000 in New Jersey. The number of physician claims was substantially larger, equaling nearly 4.9 million and 6.7 million in North Carolina and New Jersey, respectively. Part A Outpatient Department (OPD) claims numbered 1.1 million in New Jersey and only 139,864 in North Carolina.

These Part A and Part B claims can be merged to create an extremely rich data base which includes not only inpatient billing data (charges and utilization) but other information about the services provided by hospitals and physicians immediately before, during, and after an inpatient stay. The following types of information were available from the hospital claims:

- patient ID (HIC Number);
- hospital ID;
- date of admission and discharge;
- age and sex of patient;
- primary surgical procedure;
- primary diagnosis;
- secondary diagnosis (for New Jersey only); and
- total charges by service category (e.g. routine days, ICU, laboratory, operating room, etc.).

On the physician side, the following data elements were available:

- patient ID (HIC Number);
- physician ID;
- location of service (hospital, office, etc.);
- date of service;
- physician specialty;
- type of service;
- reasonable charge; and
- whether the physician accepted the claim on assignment.

The following section describes in detail the steps involved in creating the two data bases.

3.2 Constructing the Merged Hospital-Physician Data Base

3.2.1 Overview

Creating two state data bases, which include not only hospital claims data but also all physician services associated with those admissions, was not a simple task. Even before the hospital and physician claims could be merged, several rounds of cleaning and editing of the data had to be completed. Figure 3-1 presents a condensed view of the sorting, aggregation, and merging process that was undertaken on both New Jersey and North Carolina data files. The actual numbers of Part A and Part B claims which were used to construct the merged hospital-physician data bases are shown in Table 3-2.

3.2.2 Hospital Claims

We began by looking at all the Part A hospital admissions in each state. A computer tape containing all the HIC Numbers appearing on the hospital claims was made and sent to the Part B carrier in order to extract all 1982 Part B claims corresponding to those patients being admitted. A number of hospital claims were automatically dropped from the analysis because they belonged to people covered under the Railroad Retirement System and for whom we did not have Part B bills. (A separate carrier is responsible for these claims nationwide.) We were left with over 306,000 hospital admissions in New Jersey and 272,000 in North Carolina.

FIGURE 3-1 FLOW CHART OF MERGING MEDICARE PART A AND PART B CLAIMS DATA

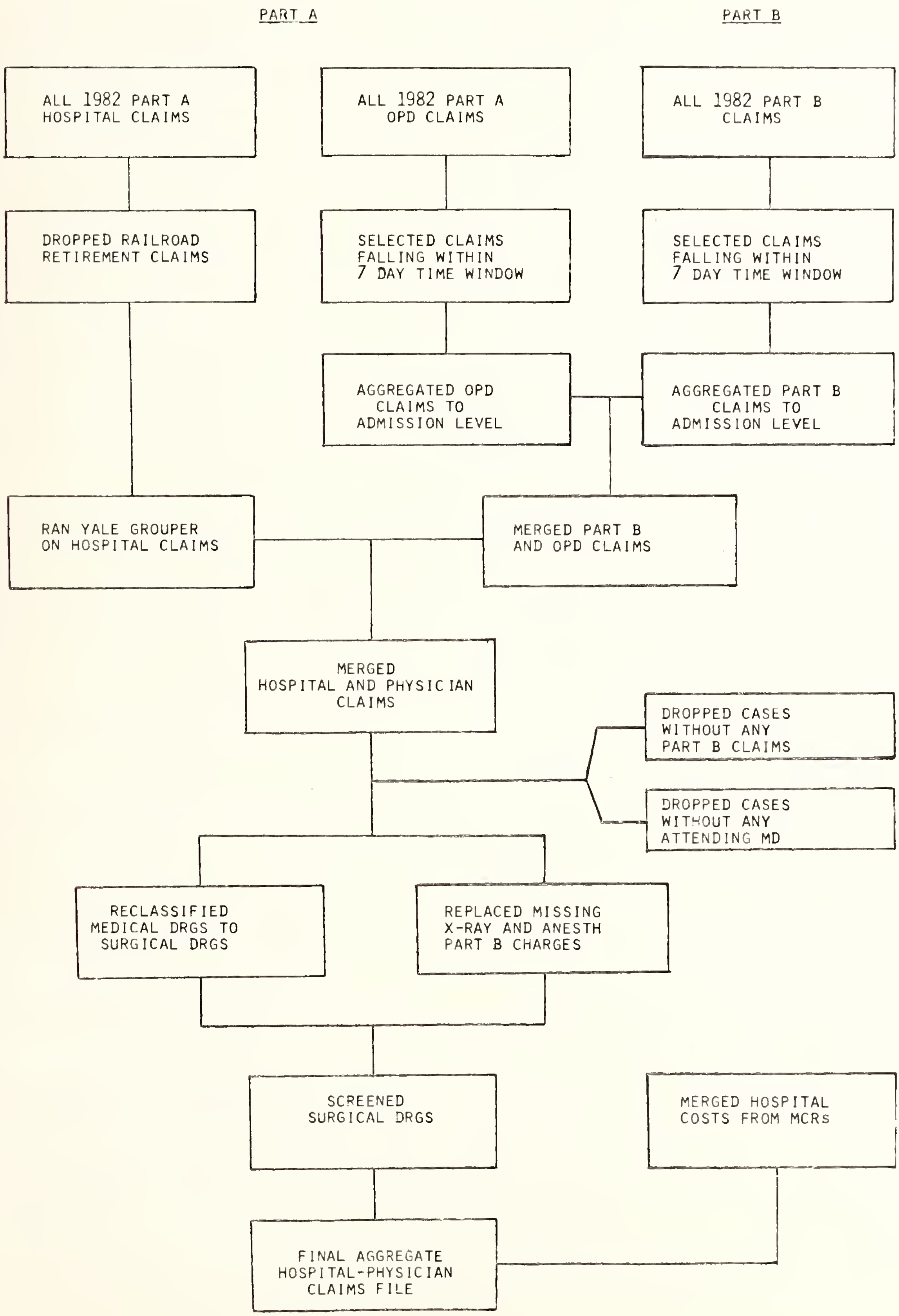

TABLE 3-2

DATA FILE CREATION FOR MERGED HOSPITAL-PHYSICIAN FILES

HOSPITAL CLAIMS DATA	New Jersey	North Carolina
Number of 1982 Hospital Claims	313,573	280,720
Number of Railroad Retirement Claims	- 6,932	- 8,459
Remaining Number of Hospital Claims	306,641	272,261
PHYSICIAN AND OPD CLAIMS DATA		
Number of 1982 Part B Claims	6,724,639	4,899,577
Number of Part B Claims Falling Outside 7 Day Time Window	-3,362,613	-2,197,741
Remaining Number of Part B Claims	3,362,026	2,701,836
Number of 1982 OPD Claims	1,101,129	139,864
Number of OPD Claims Falling Outside 7 Day Time Window	-802,604	- 112,005
Remaining Number of OPD Claims	208,525	27,859
Number of Part B & OPD Claims Aggregated to Admission Level	294,627	260,836
MERGED HOSPITAL-PHYSICIAN FILE		
Number of Hospital Admissions	306,641	272,261
Number of Admissions without Any Part B Claims	-12,968	-12,428
Number of Admissions without an Attending Physician	-21,586	-22,194
TOTAL NUMBER OF ADMISSIONS	272,087	237,639

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

The Yale Grouper program was applied to these remaining hospital admissions in each state. This software package placed each patient admission into one of 467 DRGs based on diagnosis and surgical procedure performed, if any. Those cases having diagnoses which did not match the surgical procedure listed on the hospital record were placed in DRG 468. Ungroupable cases or ones that lacked adequate information went into DRGs 469 and 470.

3.2.3 Physician and OPD Claims

At this point, our attention turned to the physician and Part A OPD claims data. We wanted to combine all physician claims related to an admission together with the hospital claim. This provides us with a much clearer picture of what is happening to a patient during any one hospitalization in terms of overall service charges and utilization. We were also interested in looking at services provided either by physicians and/or hospitals (OPD clinics) before and after inpatient admissions. This is a special concern, given the potential for cost-shifting under a physician DRG payment program. This could take the form of shifting diagnostic tests and other services from the hospital to an ambulatory setting.

Three time windows on either side of the hospitalization were considered: 7 days, 14 days, and 30 days. Ambulatory physician charges were compared for each time period for two surgical DRGs (#161 - hernia repair, and #197 - cholecystectomy) and two medical DRGs (#395 - anemia; and #403 - leukemia). The majority of charges (two-thirds or more) were incurred within the seven days immediately before and after hospitalization. Because we were more concerned with avoiding unrelated physician services than with obtaining 100 percent of charges associated with the inpatient stay, we elected to use the more conservative seven-day time window.

All Part A OPD and Part B physician claims occurring seven days before or seven days after an admission were selected off the data files. This was, of course, in addition to any physician claims billed for services performed during the hospitalization.* These claims were then aggregated to the admission level in preparation for merging to a hospital admission.

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*Any admissions which occurred either during the first week in January or the last week in December were dropped from the analysis since a full accounting of pre- and posthospitalization care would technically be impossible, as we only had 1982 data.

3.2.4 Merged Hospital-Physician Files

The next step involved matching the physician (and OPD) claims which were aggregated to the patient (or admission) level with the hospital admission itself. The merged was based on the patient's HIC number and dates of admission and discharge. While this may sound like a simple task, it involved a considerable amount of sorting which was both time-consuming and costly.

There were instances when a hospital admission did not have any corresponding Part B (or OPD) claims. Several factors could explain why this happened. First, the patient may have been admitted to a teaching institution and treated by interns, residents and/or salaried staff physicians. Hence, no physician claims would have been submitted for reimbursement. Alternatively, the patient could have been admitted by a physician who actually practices in another state and thus, he/she would submit their claims to the other state's carrier for reimbursement. Still another reason for the absence of Part B activity is simply that these patients did not have Medicare Part B coverage. Based on national statistics (Muse and Sawyer, 1981), four percent of those enrolled in the Part A Medicare program in 1979 were not also enrolled in the Part B program. Our claims mirrored this with roughly four percent of the admissions in both North Carolina and New Jersey lacking physician data. These cases were dropped from the analysis.

3.3 Cleaning the Merged Hospital-Physician Data Base

Once we merged the hospital and physician claims, several editing procedures were conducted to ensure that both state data bases provided us with statistically reliable estimates. We had to address a series of methodological issues and the subsections to follow present a detailed accounting of each issue.

3.3.1 Identifying the Attending Physician

Since the attending physician is not identified on the hospital claim (and physician claims include the services of multiple physicians), we developed the following conceptual definition of attending physician. For surgical DRGs, the attending was defined as the surgeon who performed the procedure that led to that DRG classification. For medical DRGs, the attending physician was defined as the physician billing for routine hospital visits. Operationalization of these definitions proved to be somewhat less straightforward, however.

Take the surgical DRGs, for instance. Identifying the attending physician was complicated by the presence of two completely separate surgical procedure coding systems in Parts A and B claims data. Hospitals in both states use the ICD-9 coding system which is also the only system recognized by the Yale DRG Grouper computer program. The surgical procedure codes appearing on the Part B claims were state-specific coding systems. Thus, in order to correctly identify the attending physician for each surgical admission, these state-specific codes had to be translated into the comparable ICD-9 procedure codes. This task required the expert knowledge of an Accredited Records Technician (ART) who literally translated the thousands of Part B surgical codes to ICD-9 codes. A final step involved matching the state-specific codes to the DRGs themselves base on the transformed ICD-9 codes. This was made possible by a "DRG-Finder" software package which identifies all ICD-9 procedures for each surgical DRG. The programmer was then able to take a surgical admission and scan through a list of state-specific codes in order to identify a surgical procedure included in a particular DRG. Once a procedure was found in the Part B claims that matched one on the list, the physician who performed the surgery was labelled the attending physician.

For the medical DRGs, identifying the attending physician also was a little more difficult than anticipated. In many cases, there were often several physicians providing routine care during a hospitalization. Just who should we identify as the attending physician when there are two, three or even four physicians assuming some sort of responsibility for the patient? We wanted to identify the attending physician who was most intensively involved in the care of the patient. We could have chosen the physician having the greatest number of routine visits. However, for our purposes, we selected the physician having the greatest amount of Part B charges for routine hospital care as the attending physician. By doing so, we essentially bias the choice of attending physician toward the more specialized physicians. However, information on the other physicians was saved on our analytic file in order to make comparisons in the magnitude of care given to a patient.

There were a number of admissions in both states where an attending physician could not be found. One reason, which was mentioned earlier, could be that these patients were treated in teaching hospitals and hence, no Part B claims were submitted. Another reason could be that these patients, more often than not, die after being admitted to the hospitals. Both reasons,

however, were not overwhelmingly evident when these cases were analyzed. Roughly eight percent of North Carolina cases and seven percent of cases in New Jersey were dropped because of the lack of an attending physician. This left us with 272,087 admissions in New Jersey and 237,639 in North Carolina to be used as the basis of our empirical analysis of physician DRGs.

3.3.2 Reclassifying Medical DRGs to Surgical DRGs

When the Yale DRG Grouper program was initially run on the Part A hospital claims, only one-quarter of all cases in New Jersey and 16 percent of cases in North Carolina were classified as surgical DRGs. Believing this was too low, we sought to validate the nonsurgical DRGs based on our Part B claims. Several discrepancies between the data contained in the Part B claims and those found on the hospital claim were found. For a number of medical DRG cases, we found that hospitals did one of the following:

(1) reported an unintelligible ICD-9 surgical procedure;

(2) reported a surgical procedure using the carrier's Part B coding system; or

(3) neglected to report any surgical procedure.

In all of these instances, the Yale Grouper program did not recognize the procedure as a surgery and classified the admission as a medical DRG. We corrected this, using the Part B claims data. More specifically, we were able to look at the procedures performed by physicians on patients in medical DRGs and reclassify them into surgical ones when appropriate. This assumes of course that the physician, rather than the hospital, was correct. Since the physician is paid based on the surgery performed while the hospital is not, this would seem to be and reasonable assumption. (Under the current PPS system, we would expect hospital coding of surgical procedures to improved markedly.)

It was obviously impossible to manually review every medical DRG admission. Instead, we chose to look at any surgery listed on Part B claims which totalled more than $400. This conservative dollar amount was selected as a floor so that relatively minor procedures (e.g., hernia repair, operative biopsies), but ones which qualified as surgery under the Grouper program would not be overlooked. Certain diagnostic tests performed by physicians would also be included (e.g., colonoscopy) by this dollar cut-off. Since the

reclassification was being done by hand, these diagnostic procedures could be identified, but ignored in the reclassification process. If the surgery listed on the Part B claim was one that would have been classified into a surgical DRG within the same MDC group but had not been because of poor hospital data, we reclassified the case. If not, then the procedure was inconsistent with the diagnosis and the admission was reclassified in DRG 468. There were fewer cases to reclassify in New Jersey (2 percent of cases versus 8 percent in North Carolina), undoubtedly because hospitals there were already under a DRG system and so the coding system was much more reliable. For example, in MDC 2 (diseases and disorders of the eye) we found that the majority of cases classified into medical DRG 47 (Other disorders of the Eye), actually had a surgeon who submitted a claim for a lens procedure performed even though the hospital claim had not recorded such a procedure. These cases were moved from DRG 47 into the surgical DRG for lens procedures (39). Once completed, the attending physician had to be changed from the physician providing routine hospital care to the physician performing the surgical procedure which reclassified the patient into the surgical DRG.

3.3.3 Additional Reclassification Issues

Another methodological issue concerned the existence of inconsistent Part A and Part B procedure codes for some surgical admissions. In these cases, a default condition in the computer program identified the attending physician (surgeon) based on the most expensive surgery if the "DRG-correct" surgery could not be found. This had the effect of introducing considerable "noise" into those DRGs, as well as hampering analysis because the affected DRGs would include clinically inconsistent data, e.g. a hernia repair DRG with a surgeon's bill for cholecystectomy. No patterns existed in the reporting inconsistencies which might have facilitated reclassification. We were faced with a dilemma since we knew we could correct these inconsistencies by hand yet it would be a time-consuming task. Since we were under such a strict time schedule, we decided to simply move these cases to DRG #468. While this inflates the number of cases originally classified into DRG #468, we felt it would be better to keep the cases in the surgical DRGs as clean as possible at the expense of making DRG #468 a "dump" of cases containing inconsistent information. Many of these cases would also have been classified as 468 by the Grouper as well, however, since the surgeon's reported procedure was not consistent with the diagnosis.

A smaller problem but one which also occurred in the MedPar data was when two surgical procedures were required to classify an admission into a DPG or when a medical condition was delineated only by complicating condition and not by age. Some surgical DRGs which require two procedures were not correctly classified since the hospital is required to list only one surgical procedure performed. We were able to reclassify these cases using the Part B claims. For example, take a coronary bypass with a cardiac catheterization. The hospital claims often recorded only the coronary bypass or the cardiac catheterization but not both, resulting in incorrect classification by the Grouper. Using the Part B claims we were able to identify if a patient underwent both procedures based on the extensive detail of information retained from the Part B claims.

Finally, the North Carolina Part A claims did not include secondary diagnoses, so no information on complicating conditions was available. In a few instances, presence or absence of complicating conditions is the sole stratifier for a pair of DRGs, e.g. nonspecific cerebrovascular disorders (DRGs 16 and 17). In this instance, all North Carolina admissions were classified as DRG 17. In most instances, however, the DRGs are stratified by age and/or complicating conditions, and here we were able to use age alone (generally 70 years or older vs. less than 70). For a Medicare population, this distinction is probably sufficient in the vast majority of cases. As will be seen in Chapter 4, the coefficients of variation (CVs) associated with physician charges for these DRGs are not any larger in North Carolina than those for the same DRGs in New Jersey (where the complicating condition stratifier <u>was</u> available).

3.3.4 Replacing Missing Radiology, Anesthesiology and Pathology Part B Charges

Because of combined billing through the hospital, Part B charge data were sometimes missing for hospital-based physician services, particularly radiology, anesthesiology, and pathology. Under combined billing, the hospital bills for both the Part A and Part B components of these services and reimburses the physicians on a predetermined contractual basis. To ignore these services could distort physician DRG cost weights, especially for surgical DRGs.

A sizeable proportion of surgical cases (16% in New Jersey, 40% in North Carolina) had no Part B anesthesiologist charges, yet given the nature of the surgery, we have to assume that anesthesia was used. In most of those

instances, corresponding Part A anesthesia charges were present on the hospital claim. We developed an algorithm to replace missing Part B anesthesiologist charges as follows. For those cases with both Part A and Part B anesthesia bills (the usual case), we constructed the ratio of Part A to Part B charges at the individual DRG level. This ratio was then applied to those cases with Part A charges only (i.e. those with combined billing). Based on these DRG-specific proportions, the presumed "Part B" component was netted out of the Part A total and allocated to the physician DRG. For those relatively few cases where neither Part A nor Part B charges appeared, Part B anesthesia charges were replaced with the mean anesthesiologist fee for the DRG.

A similar algorithm was used for missing Part B radiology charges, but only in those cases where evidence existed from the hospital claim that x-rays were performed approximately 89,000 cases in New Jersey and 49,000 cases in North Carolina. If no radiology charges appeared on either the Part A or Part B bills, we assumed that no x-rays were done and no values were imputed for them.

Virtually no pathology charges appeared as Part B bills (less than 5% of admissions). Imputing Part B charges from ratios based on such a small number of cases would have been too unreliable. Where Part B pathology charges did appear, we added them to the Part A laboratory charges. This approach is also consistent with recent legislation prohibiting pathologists from billing Medicare for routine inpatient lab services.

3.4 Transformation of Hospital Costs

The final methodological issue that should be discussed is the adjustments that were made to the hospital charge data. Since our objective was to measure and compare relative resource use within and among patient groups (DRGs) we wanted a similar measure for both the hospital and physician components. We also wanted a hospital cost measure comparable with that used by the Medicare program. On the physician claims, reasonable charges represent the amount paid by Medicare as well as the beneficiaries' share of costs. Hospital claims data, however, are based on charges, not costs, and therefore do not directly reflect resource utilization or what was actually paid by Medicare. In order to transform charges to costs, we adopted the same methodology used by Pettengill and Vertrees (1982) to determine cost weights for PPS.

3.4.1 Medicare Cost Reports

The data used to transform charges into costs and to devise cost weights for the individual DRGs are the Medicare Cost Reports (MCRs) for the hospitals in our two states. The MCR is an audited source of cost data which provides the basis for setting the amount of Medicare's final payment for the hospital. The most recent year of these data, FY1981, were used in the construction of our cost-to-charge ratios and average per diem costs.

3.4.2 Constructing Reasonable Costs

Following the classification of each admission into one of the 470 DRGs as described above, we used the following method to compute cost per case.

Step 1. Create an adjusted routine cost per day.

Multiply the number of days the patient spent in routine care by the hospital's routine cost per day (RCPD) net of direct teaching and depreciation,

$$\text{where RCPD} = \frac{\text{Total Medicare Allowable Routine Costs}}{\text{Total Medicare Routine Days}}$$

Step 2. Create an adjusted special care cost per day

Multiply the number of days the patient spent in special care by the hospitals special care cost per day (SPCPD), net of direct teaching costs and depreciation,

$$\text{where SPCPD} = \frac{\text{Total Medicare Allowable Special Costs}}{\text{Total Medicare Special Days}}$$

Step 3. Multiply the ancillary charges by the appropriate departmental cost to charge ratio.

We combined cost and charges on the MCRs into the following five cost centers:

Operating Room
Laboratory
Radiology
Anesthesiology
Other

These costs are also net of interns' and residents' salaries, and depreciation.

Step 5. Inflate per diem rates to 1982 dollars.

The costs per day created in steps 1 and 2 above were inflated to 1982 dollars using a state specific inflation rate calculated based on the increase in total expense per day in short-term general hospitals in the respective states as reported by the American Hospital Association. The costs per day were also adjusted according to the fiscal year dates on the MCR. For example, hospitals reporting their fiscal year beginning July 1, 1980 and ending June 30, 1981 were inflated to represent December 1981 dollars and then again to reflect December 1982 dollars.

Step 6. The adjusted cost per case (ACPC) is computed by multiplying these components and summing:

1. The Routine Per Diem Cost x Routine LOS = Routine Costs

2. The Special Care Per Diem Cost x Special Care LOS = Special Care Costs

3. Ancillary Cost/Charge Ratio x Ancillary Charge = Ancillary Cost

Step 7. Adjust for indirect teaching costs.

The next step is to standardize the adjusted cost values from step 6 for the gross indirect effects of variation in teaching effort across hospitals. This adjustment is done by dividing the cost from Step 6 by a measure of teaching activity (TEACH) within each hospital,

$$\text{where TEACH} = 1.0 + .569 * \left[\frac{\text{Interns and Residents}}{\text{Hospital Beds}}\right]$$

This derivation of the adjustment is described in detail in Pettengill and Vertrees. Suffice it to say that this adjustment is equal to 1.0 where there are no interns or residents. A hospital with .10 interns and residents per bed would have an adjustment of nearly 6 percent (1.0569).

3.4.3 Missing MCR Data

There were several instances in both states where we did not have Medicare Cost Report data. Generally these hospitals were specialty (e.g. eye and ear) or psychiatric institutitions whose MCRs are not computerized. For those hospitals with missing cost data, we substituted state specific mean values for each of the components described above, i.e. radiology cost-to-charge ratio, routine cost per day, etc. Hospitals were first stratified based on urban/rural location and type of ownership (e.g. proprietary, private non-profit, etc.).

Although we replaced cost data for 25 hospitals (of a total 155) in North Carolina, these hospitals accounted for only 2.2 percent of total admissions. Likewise in New Jersey, the 27 hospitals without MCRs (out of 121) admitted only 1.6 percent of total admissions.

3.5 Sample Sizes and Description

The basic empirical analysis is based on all inpatient admissions in the two states: 272,087 in New Jersey and 237,639 in North Carolina. For ease of presentation, however, we focus in several of our chapters on 25 high volume DRGs, which account for about a third of all Medicare admissions. In selecting these DRGs, we also took the following criteria into account:

(1) The should represent both medical and surgical conditions.

(2) The major MDCs should be represented (9 are included here).

(3) Surgical DRGs should include both discretionary operations, like lens procedures and nonelective surgery, like bowel procedures.

(4) Medical DRGs should include both acute (e.g. pneumonia) and chronic (e.g. diabetes) conditions.

(5) The DRGs should be ones treated by a wide range of physician specialties.

Sample sizes for these DRGs are shown in Table 3-3.

TABLE 3-3

SAMPLE SIZES FOR SELECTED DRGS

DRG		New Jersey	North Carolina
14	Specific Cerebrovasc Dis exc TIA	8,410	7,021
15	Transient Ischemic Attacks	5,634	2,767
16	Nonspecific Cerebrovasc Dis w/ CC	285	--
17	Nonspecific Cerebrovasc Dis w/o CC	870	1,216
39	Lens Procedures	8,378	9,398
89	Pneumonia Age 70+ &/or CC	4,772	4,714
90	Pneumonia Age 18-69 w/o CC	840	1,401
115	Perm Pacemaker Implant w/AMI or CHF	206	144
116	Perm Pacemaker Implant w/o AMI or CHF	1,798	925
127	Heart Failure & Shock	15,964	7,711
132	Atherosclerosis Age 70+ &/or CC	2,381	6,044
133	Atherosclerosis Age $<$ 70 w/o CC	638	2,526
140	Angina Pectoris	9,488	4,547
148	Major Bowel Procs Age 70+ &/or CC	2,089	1,058
149	Major Bowel Procs Age $<$ 70 w/o CC	740	322
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	6,413	8,316
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	1,919	3,822
195	Cholecystectomy w/CDE Age 70+ &/or CC	402	322
196	Cholecystectomy w/CDE Age $<$ 70 w/o CC	117	126
197	Cholecystectomy w/o CDE Age 70+ &/or CC	1,544	1,309
198	Cholecystectomy w/o CDE Age $<$ 70 w/o CC	723	798
209	Major Joint Procedures	2,359	597
294	Diabetes Age 36+	4,403	4,635
336	Transurethral Prostatectomy Age 70+ &/or CC	2,832	2,403
337	Transurethral Prostatectomy Age $<$ 70 w/o CC	936	870

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

4.0 PHYSICIAN DRGS EXPLAINED

4.1 Overview

Here, for the first time, we examine physician DRG payments, what they look like and how much cost variation remains unexplained. For much of our analysis, we focus on the 25 high-volume medical and surgical DRGs described in Chapter 3. Together, these DRGs account for one-third of all Medicare admissions in our two states. Complete detail on all 468 DRGs can be found in the Appendices.

In this chapter, we seek to answer the following questions:

(1) Do DRGs successfully "define" packages of physician services, or do we observe as much variation within DRG as between? In particular, does the DRG classification system yield groups of admissions that are as meaningful for physician reimbursement purposes as those for hospital payment?

(2) Do certain DRGs produce a more homogeneous package, in terms of costs, than others, e.g., surgical versus medical DRGs?

(3) What is the relationship between physician and hospital DRG costs? Are the more expensive hospital DRG cases also more costly for physicians?

(4) What impact does the removal of outliers have on within-DRG variation? Is an outlier case under the hospital PPS necessarily an outlier for physician reimbursement?

Finally, and perhaps most important:

(5) How much of the variation in physician costs remains unexplained by the DRG system?

4.2 Comparison of Physician and Hospital DRG Payments

4.2.1 How Much Does a Physician DRG "Cost"?

Table 4-1 presents mean physician DRG payments for our two states, New Jersey and North Carolina. Mean "payments" are simply the average costs for all physician services provided during the hospital stay. Physician costs are defined as Medicare reasonable charges. (Because of the reimbursement ceiling imposed by the prevailing charge limits, the use of Medicare reasonables places an upper bound on physician cost variation.) Hospital costs by DRG are

TABLE 4-1

MEAN DRG PAYMENTS FOR HOSPITALS AND PHYSICIANS (CVs in parentheses)

DRG		New Jersey Hospital	New Jersey Physician	North Carolina Hospital	North Carolina Physician
14	Specific Cerebrovasc Dis exc TIA	$3162 (1.06)	$ 763 (0.74)	$2524 (1.07)	$ 418 (0.90)
15	Transient Ischemic Attacks	1947 (0.90)	575 (0.69)	1377 (1.10)	343 (1.10)
16	Nonspecific Cerebrovasc Dis w/ CC	3109 (0.85)	737 (0.70)	--	--
17	Nonspecific Cerebrovasc Dis w/o CC	2132 (0.84)	592 (0.76)	1830 (1.06)	370 (1.03)
39	Lens Procedures	1218 (0.56)	1842 (0.26)	1099 (0.49)	1293 (0.21)
89	Pneumonia Age 70+ &/or CC	3296 (1.02)	604 (0.88)	2315 (1.10)	320 (0.92)
90	Pneumonia Age 18-69 w/o CC	2667 (1.06)	562 (1.01)	2178 (1.23)	311 (0.98)
115	Perm Pacemaker Implant w/AMI or CHF	9354 (0.51)	2594 (0.29)	8241 (0.51)	1715 (0.29)
116	Perm Pacemaker Implant w/o AMI or CHF	7186 (0.43)	2259 (0.30)	6693 (0.50)	1571 (0.30)
127	Heart Failure & Shock	2871 (0.97)	573 (0.84)	2274 (1.18)	348 (0.94)
132	Atherosclerosis Age 70+ &/or CC	2578 (1.44)	544 (0.78)	2113 (1.11)	374 (1.28)
133	Atherosclerosis Age < 70 w/o CC	2609 (1.32)	592 (1.38)	2070 (1.12)	443 (1.44)
140	Angina Pectoris	2080 (0.70)	468 (1.00)	1710 (0.91)	331 (1.59)
148	Major Bowel Procs Age 70+ &/or CC	7090 (0.87)	2555 (0.40)	5426 (1.04)	1673 (0.41)
149	Major Bowel Procs Age < 70 w/o CC	5833 (0.71)	2438 (0.36)	4679 (0.81)	1591 (0.34)
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	1986 (1.10)	588 (0.81)	1369 (1.12)	330 (0.94)
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	1747 (0.88)	573 (0.82)	1256 (0.96)	333 (0.92)
195	Cholecystectomy w/CDE Age 70+ &/or CC	5445 (0.76)	2200 (0.31)	4479 (1.10)	1493 (0.30)
196	Cholecystectomy w/CDE Age < 70 w/o CC	4498 (0.79)	1980 (0.30)	3360 (0.73)	1430 (0.28)
197	Cholecystectomy w/o CDE Age 70+ &/or CC	4139 (0.96)	1855 (0.38)	3258 (0.80)	1246 (0.30)
198	Cholecystectomy w/o CDE Age < 70 w/o CC	3018 (0.65)	1631 (0.32)	2643 (0.66)	1182 (0.26)
209	Major Joint Procedures	6023 (0.57)	2842 (0.33)	5801 (0.52)	2576 (0.23)
294	Diabetes Age 36+	2391 (1.02)	533 (0.88)	1691 (1.08)	303 (0.93)
336	Transurethral Prostatectomy Age 70+ &/or CC	2767 (0.77)	1679 (0.30)	2165 (0.63)	1219 (0.23)
337	Transurethral Prostatectomy Age < 70 w/o CC	2231 (0.70)	1545 (0.22)	1886 (0.64)	1174 (0.21)

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

included for comparison. These costs are based on submitted charges which have been adjusted to reflect Medicare operating costs using each hospital's Medicare Cost Report. For ease of presentation, we refer to both the Part A and Part B components as costs. In both instances, costs represent what the Medicare program actually paid in 1982, including patient deductibles and copays.

In parentheses next to each DRG payment is its coefficient of variation (CV). The coefficient of variation is defined as the standard deviation divided by the mean; it provides a standardized measure for comparing variation across groups with different means. Lower CVs indicate less cost variability within DRG and hence imply greater homogeneity in resource use.

Mean payments vary across physician DRGs much as we might expect. Pacemaker cases where the patient has an acute myocardial infarction or congestive heart failure (DRG 115) cost $200-300 more to treat than pacemaker cases with other diagnoses (DRG 116): $2594 vs. $2259 in New Jersey and $1715 versus $1571 in North Carolina. Similarly, cholecystectomies involving a common duct exploration (DRGs 195 and 196) are more expensive admissions than those without exploration (DRGs 197 and 198). Otherwise similar patients who are 70 years and over or who have complicating conditions should also be more physician-intensive, and hence be more expensive. For surgical DRGs, this appears to be the case, but for the atherosclerosis DRGs (132 and 133), the opposite is true and for many medical DRGs the differences are small or non-existent. Consider pneumonia, for example. New Jersey patients in the more seriously ill DRG 89 consume only 7 percent more physician resources than those in DRG 90, and North Carolina patients less than 3 percent more. By contrast, more complicated pneumonia cases are far more costly for New Jersey hospitals (24%) while only slightly more expensive for North Carolina hospitals (6%).

4.2.2 Variation Within Physician DRGs

More important than the average payment level is the variation around that mean, for this indicates the likelihood that the DRG payment will in fact reflect the costs incurred by the physician. Consider a hypothetical DRG payment of $1,000 for example. A CV of 0.20 means that two-thirds of the

admissions in that DRG cost between $800 and $1200*, and that the payment will be within $200 of what physicians actually have spent in the majority of cases. A CV of 0.80 for the same hypothetical DRG, on the other hand, means that actual physician costs will range from $200 to $1800 in most admissions (i.e., within one standard deviation). Thus, the larger the CV, the greater will be the amount of potential under - or overpayment.

What is immediately striking from Table 4-1 is the difference in magnitude of CVs between medical and surgical physician DRGs. Surgical DRGs are quite homogeneous with CVs of 0.40 or lower. Some show remarkably little variation in physician inputs, such as lens procedures (DRG 39) with CVs of only 0.26 and 0.21, respectively in the two states. By contrast, medical DRGs vary dramatically, with CVs ranging from 0.70 to over 1.50. Consider angina pectoris (DRG 140) in New Jersey, for example. Although the average MDDRG payment is quite low ($468 per admission), the range in costs are staggering, from $40 to $15,000. This degree of variation suggests that physicians would end up being either significantly under- or over-paid in nearly every case. It is possible, however, that much of this variation in input mix and charges is due to the physician specialty treating the patient; if so, then specialty-specific payment rates might prove more equitable. We explore this directly in Chapter 5.

Why do we observe so much more variation in these medical physician DRGs? One reason may be the multiplicity of specialties involved. Surgical DRGs are usually managed by physicians in the same specialty, or at most two specialties. Lens procedures, for example, are performed almost exclusively by ophthalmologists, while general surgeons account for most of the cholecystectomies. Not only do physicians in the same (or related) specialties charge similar fees, but they also are apt to use similar inputs from other physicians. By contrast, attending physicians for medical DRGs come from a wide range of specialties. In New Jersey, for example, pneumonia is handled by internists in 58 percent of the cases and by general practitioners in another 13 percent. The remaining are treated by a diverse group, including cardiologists, general surgeons, family practitioners and pulmonary disease specialists. These specialists in lung disease presumably

*Assumes a normal distribution. As many DRGs exhibit skewed distributions, the two-thirds within one standard deviation rule is only an approximation.

not only charge more than general practitioners but also prescribe a different mix of other physician inputs. One could argue that the pulmonary specialist is treating a different case, perhaps a sicker patient, than is the general practitioner, but this would mean that the two pneumonia DRGs are not adequate measures of casemix severity.

A second reason for differences between medical and surgical DRGs may lie in the extent to which certain physician inputs are fixed or non-discretionary. Surgical DRGs always include both a surgeon and anesthesiologist; together these two account for two-thirds or more of the total DRG cost. The only fixed input for medical DRGs, on the other hand, is the attending physician (whose bill is included under routine hospital visits). Even this input will vary tremendously, however, as a function of length of stay.

4.2.3 Hospital vs. Physician DRG Variation

Surprisingly, coefficients of variation for physician DRGs are nearly always smaller than those for hospital DRGs (Table 4-1), with the difference particularly marked for surgical DRGs. For DRGs 336 and 337, for example, the CVs associated with hospital costs are two to three times those for physician costs. Since physicians are responsible for ordering hospital services in the first place, we might expect the DRG classification system to minimize within-group variation for both sets of costs. If anything, we would have expected the system to perform better on hospital costs since it was developed based on hospital data alone. Instead, the opposite is true.

This apparent paradox may be partly explained by differences in Medicare reimbursement for Part A and Part B services. Within a given reasonable charge locality,* physicians are paid the lower of their billed charge, the customary screen, or the prevailing charge, adjusted by the Medicare Economic Index (MEI) to produce a reasonable charge. Because the MEI-adjusted prevailing effectively acts as a cap on physician reimbursement and because many physicians have reached this ceiling, physician fee variation will be constrained for this reason alone. By contrast, until the recent PPS

*New Jersey has three localities corresponding to the northern, central and southern portions of the state, while North Carolina has two, corresponding to SMSAs and non-SMSAs.

legislation, Medicare Part A reimbursed hospitals based on their reasonable costs without imposing any significant reimbursement ceilings and without making intra-area comparisions.* As a result, we might expect hospital costs to vary more than physician fees. (Of course, variation in inputs or intensity of services remains unaffected by these reimbursement procedures.)

Another reimbursement difference lies in the extent to which physician services for surgical care are already packaged. Surgeons are paid a global fee that covers the procedure itself plus routine follow-up care. If a post-operative patient remains in the hospital two days longer than average, the surgeon's fee is unchanged and total physician DRG costs may be largely unaffected. (While other physician services may be provided during those extra two days, their costs will be small relative to the surgeon's fee which generally accounts for at least one-half of the total DRG cost.) Hospital DRG costs, on the other hand, may be greatly increased by that longer stay.

4.3 Length of Stay by DRG

Table 4-2 compares length of stay across DRGs for our two states. Length of stay patterns generally mirror those for hospital costs, although the differences are often sharper and more consistent with the DRG classification. Atherosclerosis patients over 69 years or with complicating conditions (DRG 132) clearly stay longer in the hospital than do less complicated cases (DRG 133), for example, even though their hospital costs were not any higher.

What is most striking, however, are the consistent differences in length of stay between the two states. New Jersey patients remain in the hospital 2-3 days longer than otherwise similar patients in North Carolina. For some complex surgical DRGs, the differences are even larger: 4 extra days in the hospital for patients undergoing major bowel procedures and 5 more days for major joint procedures. Longer stays in New Jersey obviously drive up total costs for both hospital and physician DRGs. Such differences suggest that, like the hospital PPS, a physician DRG reimbursement system might be based on national practice patterns. We will examine this in more detail when we decompose physician DRGs in Chapter 5.

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*HCFA, in fact, has applied routine cost ceilings to hospital costs since 1972 based on peer groups. Penalties due to the ceilings have been very minor, however. Ancillary costs, which make up more than 50 percent of bills, remain unconstrained.

TABLE 4-2

MEAN HOSPITAL LENGTH OF STAY FOR SELECTED DRGS (CVs in parentheses)

DRG		New Jersey	North Carolina
14	Specific Cerebrovasc Dis exc TIA	19.0 (0.97)	16.4 (0.96)
15	Transient Ischemic Attacks	10.9 (0.82)	7.8 (0.83)
16	Nonspecific Cerebrovasc Dis w/ CC	16.8 (0.96)	--
17	Nonspecific Cerebrovasc Dis w/o CC	12.3 (0.79)	11.6 (0.88)
39	Lens Procedures	4.1 (0.60)	3.7 (0.49)
89	Pneumonia Age 70+ &/or CC	14.5 (0.81)	12.2 (0.78)
90	Pneumonia Age 18-69 w/o CC	11.8 (0.64)	10.4 (0.68)
115	Perm Pacemaker Implant w/AMI or CHF	20.2 (0.45)	15.6 (0.61)
116	Perm Pacemaker Implant w/o AMI or CHF	14.4 (0.66)	11.8 (0.61)
127	Heart Failure & Shock	13.4 (0.81)	11.0 (0.84)
132	Atherosclerosis Age 70+ &/or CC	12.1 (0.77)	10.7 (0.85)
133	Atherosclerosis Age < 70 w/o CC	11.0 (0.70)	8.4 (0.70)
140	Angina Pectoris	9.8 (0.72)	7.8 (0.22)
148	Major Bowel Procs Age 70+ &/or CC	23.6 (0.63)	19.9 (0.64)
149	Major Bowel Procs Age < 70 w/o CC	20.5 (0.54)	16.7 (0.47)
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	10.5 (0.80)	8.3 (0.76)
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	9.3 (0.77)	7.6 (0.75)
195	Cholecystectomy w/CDE Age 70+ &/or CC	20.2 (0.57)	17.0 (0.50)
196	Cholecystectomy w/CDE Age < 70 w/o CC	16.8 (0.49)	14.9 (0.46)
197	Cholecystectomy w/o CDE Age 70+ &/or CC	15.9 (0.71)	13.7 (0.59)
198	Cholecystectomy w/o CDE Age < 70 w/o CC	12.4 (0.51)	11.5 (0.50)
209	Major Joint Procedures	22.7 (0.58)	17.5 (0.42)
294	Diabetes Age 36+	13.3 (0.84)	10.6 (0.77)
336	Transurethral Prostatectomy Age 70+ &/or CC	11.9 (0.73)	10.2 (0.61)
337	Transurethral Prostatectomy Age < 70 w/o CC	9.6 (0.46)	8.6 (0.47)

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

4.4 Physician vs. Hospital DRG Cost Weights

If physician and hospital services are complementary inputs in the production of an inpatient stay, then we would expect physician DRGs to exhibit the same relationship with each other that hospital DRGs do. Table 4-3 presents cost weights for both hospital and physician DRGs. Each set of weights has been standardized by the average cost per case, hospital and physician respectively, for each state. Medicare PPS costs weights are also included for reference. The PPS weights and our hospital cost weights will obviously differ in absolute magnitude for several reasons. First, PPS weights are based on trimmed data from a national sample, while ours are derived from untrimmed data representing virtually all Medicare admissions in just two states. Second, as discussed in Chapter 3, our DRGs tend to be purer and more homogeneous, since Part B records were used to validate DRG assignment. (By trimming extreme outliers from the Medicare data, some erroneously classified cases will be excluded from the PPS calculations, thereby improving homogeneity within their DRGs.) Relative differences across DRGs should be comparable, however, between the two data sets.

As a rule, more expensive hospital DRGs are also more expensive physician DRGs. Patients with pacemaker implants (DRGs 115 and 116), for example, cost two to three times more than average for both hospitals and physicians to treat. There are a couple of notable exceptions, however. Two simple surgical DRGs, lens procedures and TURPs, are very inexpensive from the hospital's perspective (with weights well below 1.0), but their physician costs run well above average (1.5-2.0). Nevertheless, the simple correlation of hospital and physician cost weights across all DRGs is positive and significant: r= 0.84 in both states.

Although surgical DRGs generally are more costly for both hospitals and physicians, the disparity between medical and surgical costs is far more marked for physicians' services. Consider heart failure and shock (DRG 127). The hospital uses about half the resources caring for the heart failure patient that it does for the patient undergoing a cholecystectomy with CDE. The physician DRG payment for cholecystectomy with CDE, however, is three to four times greater than that for the heart failure case. In fact, the heart patient may actually be far more time consuming, and MD-DRG cost weights, as currently constructed, will preserve any reimbursement inequities between medicine and surgery.

TABLE 4-3

COMPARISON OF PPS, HOSPITAL, AND PHYSICIAN DRG COST WEIGHTS

DRG		National PPS	New Jersey		North Carolina	
			Hospital	Physician	Hospital	Physician
14	Specific Cerebrovasc Dis exc TIA	1.353	1.248	0.759	1.075	0.700
15	Transient Ischemic Attacks	0.667	0.634	0.572	0.587	0.551
16	Nonspecific Cerebrovasc Dis w/ CC	0.859	1.012	0.734	—	—
17	Nonspecific Cerebrovasc Dis w/o CC	0.839	0.694	0.589	0.779	0.594
39	Lens Procedures	0.501	0.397	1.833	0.468	2.074
89	Pneumonia Age 70+ &/or CC	1.103	1.073	0.601	0.986	0.514
90	Pneumonia Age 18-69 w/o CC	0.985	0.869	0.559	0.928	0.500
115	Perm Pacemaker Implant w/AMI or CHF	3.915	3.046	2.582	3.510	2.768
116	Perm Pacemaker Implant w/o AMI or CHF	2.867	2.340	2.248	2.851	2.523
127	Heart Failure & Shock	1.041	0.935	0.571	0.969	0.558
132	Atherosclerosis Age 70+ &/or CC	0.918	0.839	0.542	0.900	0.600
133	Atherosclerosis Age <70 w/o CC	0.860	0.850	0.590	0.882	0.711
140	Angina Pectoris	0.755	0.677	0.466	0.728	0.531
148	Major Bowel Procs Age 70+ &/or CC	2.549	2.309	2.542	2.311	2.685
149	Major Bowel Procs Age <70 w/o CC	2.215	1.899	2.426	1.993	2.552
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	0.619	0.647	0.585	0.583	0.530
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	0.565	0.569	0.570	0.535	0.534
195	Cholecystectomy w/CDE Age 70+ &/or CC	2.169	1.773	2.189	1.908	2.396
196	Cholecystectomy w/CDE Age <70 w/o CC	2.059	1.465	1.970	1.431	2.295
197	Cholecystectomy w/o CDE Age 70+ &/or CC	1.487	1.348	1.846	1.388	2.000
198	Cholecystectomy w/o CDE Age < 70 w/o CC	1.275	0.983	1.624	1.126	1.896
209	Major Joint Procedures	2.291	1.961	2.828	2.471	4.133
294	Diabetes Age 36+	0.809	0.779	0.530	0.720	0.486
336	Transurethral Prostatectomy Age 70+ &/or CC	1.008	0.901	1.671	0.922	1.955
337	Transurethral Prostatectomy Age <70 w/o CC	0.849	0.727	1.538	0.803	1.883

Source: PPS cost weights are taken from the Federal Register 9/1/83. The remaining cost weights were calculated from 1982 Medicare Part A and Part B claims from the two states.

The surgical-medical DRG payment differential is even larger for North Carolina physicians than in New Jersey. This can undoubtedly be explained by differences in the size and mix of physician supply in the two states. Fewer surgeons per capita in North Carolina (only four-fifths as many as New Jersey) may drive up the relative prices for surgery in that state. Even more important, the heavy concentration of GPs in North Carolina relative to medical specialists may depress relative prices for medical DRGs. (There are two GPs for every three medical specialists in North Carolina vs only 1 GP in New Jersey.) This explanation assumes that GPs also are admitting Medicare patients in roughly these same proportions. We examine this directly in Chapter 5.

4.5 The Role of Outliers

Earlier in Table 4-1, we saw that medical DRGs exhibited considerable variation in physician costs. Unlike surgical DRGs whose resource use may be fairly easily predicted by the operation itself, physician inputs to medical DRGs are far more variable. The very high CVs observed for medical DRGs may be at least partially due to a relatively small number of cases with exceptionally high costs. What impact does removing these outliers have on within-DRG variation?

Although there are many ways to trim data for extreme values, we chose to adopt the same approach used by Pettengill and Vertrees (1982) in developing the PPS cost weights. This meant dropping cases whose costs exceeded three standard deviations times the geometric mean for each DRG.* Use of this criterion eliminated 2.0 and 2.2 percent of cases in New Jersey and North Carolina, respectively.

Table 4-4 compares physician DRG means and CVs before and after removing outliers. The untrimmed columns are identical to those shown in Table 4-1. As expected, means fall slightly and CVs fall dramatically after extreme values are removed. The greater the within-DRG variation to start with, the

*The MDDRG payment data, like most cost data, exhibits a marked right skew. Costs may be (in theory) infinitely high but can never fall below zero. Use of the geometric mean better captures the skewness of this kind of distribution than does the arithmetic mean.

TABLE 4-4

COMPARISON OF UNTRIMMED AND TRIMMED PHYSICIAN DRGS[a]

DRG		New Jersey		North Carolina	
		Untrimmed	Trimmed	Untrimmed	Trimmed
14	Specific Cerebrovasc Dis exc TIA	$ 763 (0.74)	$ 717 (0.59)	$ 418 (0.90)	$ 386 (0.68)
15	Transient Ischemic Attacks	575 (0.69)	540 (0.54)	343 (1.10)	316 (0.72)
16	Nonspecific Cerebrovasc Dis w/ CC	737 (0.70)	692 (0.60)	—	--
17	Nonspecific Cerebrovasc Dis w/o CC	592 (0.76)	551 (0.54)	370 (1.03)	342 (0.68)
39	Lens Procedures	1842 (0.26)	1826 (0.24)	1293 (0.21)	1288 (0.20)
89	Pneumonia Age 70+ &/or CC	604 (0.88)	550 (0.69)	320 (0.92)	295 (0.65)
90	Pneumonia Age 18-69 w/o CC	562 (1.01)	509 (0.71)	311 (0.98)	282 (0.64)
115	Perm Pacemaker Implant w/AMI or CHF	2594 (0.29)	2546 (0.24)	1715 (0.29)	1690 (0.27)
116	Perm Pacemaker Implant w/o AMI or CHF	2259 (0.30)	2210 (0.26)	1571 (0.30)	1552 (0.26)
127	Heart Failure & Shock	573 (0.84)	528 (0.64)	348 (0.94)	315 (0.67)
132	Atherosclerosis Age 70+ &/or CC	544 (0.78)	506 (0.61)	374 (1.28)	334 (0.74)
133	Atherosclerosis Age < 70 w/o CC	592 (1.38)	541 (0.69)	443 (1.44)	384 (0.80)
140	Angina Pectoris	468 (1.00)	440 (0.57)	331 (1.59)	290 (0.74)
148	Major Bowel Procs Age 70+ &/or CC	2555 (0.40)	2476 (0.33)	1673 (0.41)	1618 (0.31)
149	Major Bowel Procs Age < 70 w/o CC	2438 (0.36)	2376 (0.32)	1591 (0.34)	1553 (0.26)
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	588 (0.81)	544 (0.63)	330 (0.94)	305 (0.66)
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	573 (0.82)	531 (0.63)	333 (0.92)	305 (0.67)
195	Cholecystectomy w/CDE Age 70+ &/or CC	2200 (0.31)	2155 (0.27)	1493 (0.30)	1439 (0.24)
196	Cholecystectomy w/CDE Age < 70 w/o CC	1980 (0.30)	1948 (0.25)	1430 (0.28)	1389 (0.22)
197	Cholecystectomy w/o CDE Age 70+ &/or CC	1855 (0.38)	1787 (0.30)	1246 (0.30)	1211 (0.24)
198	Cholecystectomy w/o CDE Age < 70 w/o CC	1631 (0.32)	1590 (0.26)	1182 (0.26)	1154 (0.22)
209	Major Joint Procedures	2842 (0.33)	2775 (0.20)	2576 (0.23)	2552 (0.21)
294	Diabetes Age 36+	533 (0.88)	493 (0.64)	303 (0.93)	276 (0.63)
336	Transurethral Prostatectomy Age 70+ &/or CC	1679 (0.30)	1636 (0.23)	1219 (0.23)	1196 (0.18)
337	Transurethral Prostatectomy Age < 70 w/o CC	1545 (0.22)	1517 (0.17)	1174 (0.21)	1153 (0.16)

[a]Trimmed data exclude outliers, defined as cases exceeding three standard deviations from the geometric mean.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

bigger the drop; in the case of angina pectoris (DRG 140), the CV is literally halved. Nevertheless, medical MD-DRGs still exhibit considerable variation, with CVs in the 0.6 to 0.8 range. Of course, the CVs can be reduced as much as desired by lowering outlier thresholds, but this debases the classification system to a marked degree.

If a physician DRG system is going to be integrated with the existing hospital PPS, then the outlier policies must also be integrated. If every physician cost outlier is also a hospital cost outlier, this is straight forward, but if not, tremendous opportunities for "gaming" could develop.* Table 4-5 illustrates the extent of overlap between physician and hospital DRG outliers and some differences across them, using DRG 14 (specific cerebrovascular disorders, excluding transient ischemic attacks) as an example. The overlap is fairly limited; only one-fifth of New Jersey outliers and one-eighth of those in North Carolina had both physician and hospital costs that exceeded the trim points. Since these cut-offs are somewhat arbitrary, we examined hospital-only outliers whose physician costs were within 10 percent of the physician trim-point and physician-only outliers whose hospital costs were within 10 percent of the hospital cut-off. Redefining these cases as outliers for both physician and hospital costs would still only increase the overlap to 29 percent of all outliers in New Jersey and 21 percent in North Carolina.

What makes hospital-only and physician-only outliers different? From Table 4-5, we see that hospital-only cost outliers are characterized by longer hospital stays, either overall or in the intensive care unit, while physician-only cost outliers have more consultations per admission and are much more likely to have some diagnostic surgery (ranging from spinal punctures to cardiac catheterizations). Hospital-only cost outliers may be more seriously ill, as they are far more likely to die during hospitalization. This, together with differences in surgical rates, suggests that physician-only outliers may be patients in the initial, evaluative phase of their illness, while hospital-only outliers have reached the terminal stage of their disease. Hospital-only outliers are also much less likely to have a specialist as an attending physician, probably one reason for their relatively

*Assuming, of course, that hospital and physicians payments are made separately.

TABLE 4-5

COMPARISON OF PHYSICIAN AND HOSPITAL COST OUTLIERS: SPECIFIC CEREBROVASCULAR DISORDERS (DRG 14)

	New Jersey			North Carolina		
	Hospital Outlier Only (47%)	Physician Outlier Only (32%)	Outlier on Both (21%)	Hospital Outlier Only (49%)	Physician Outlier Only (38%)	Outlier on Both (13%)
Hospital Costs	$18,651	$18,758	$23,527	$13,509	$4,256	$19,772
Physician Costs	1,339	2,982	3,429	948	2,255	2,177
ICU LOS (days)	4	3	11	5	0	11
Total LOS (days)	67	47	81	42	57	44
No. of Consults	1.7	3.2	3.9	0.7	2.1	2.5
Percent with Diagnostic Surgery	28%	73%	67%	30%	60%	81%
Mortality Rate	34%	30%	41%	23%	11%	32%
Specialty of Attending MD:						
GP/FP	24%	9%	17%	19%	6%	3%
Internist	45	53	67	43	52	42
Cardiologist	8	10	6	3	4	3
Neurologist	7	14	2	27	27	42
Other Specialists	16	14	8	8	11	10

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

lower physician costs. Finally, cases with extreme costs for both hospital and physician services are clearly the most resource-intensive and probably the sickest of all.

4.6 Explanatory Power of DRGs

Earlier we saw that some physician DRGs appeared quite homogeneous in their resource use while others displayed considerable cost variation. But we only looked at a relatively small number of DRGs (although they account for a disproportionate share of Medicare admissions). How well do DRGs as a group explain variation in physician costs? In order to have a reference point for comparison, we also tested the ability of the DRG classification system to predict hospital costs. Since the system was developed based on hospital cost data, it would not be fair to expect DRGs to do a better job of explaining cost variation for physicians than for hospitals.

Table 4-6 summarizes the variation (as measured by the R^2) in hospital and physician costs explained by DRGs, based on analysis of variance. The findings are astonishing: DRGs are far superior in explaining physician cost variation with an R^2 of 0.57 based on all cases vs. only 0.16 to 0.18 for hospitals. Excluding outlier cases (using the same methodology described in Section 4.5) definitely boosts the R^2s but does not narrow the differential in explained variance between the two sets of costs. Based on trimmed data, DRGs explain 70-75 percent of the variation in physician costs but only 32 percent for hospital costs. This means that over two-thirds (68%) of the variation in hospital costs is unexplained, that is, explained by other (unknown) factors not captured by the DRG system.

We are faced here with two unexpected and surprising findings. First, not only do DRGs work better for physicians than for hospitals, but second, the DRGs perform fairly poorly in explaining hospital costs. Of course, our data are limited to Medicare admissions, so some variation that DRGs otherwise would capture has been eliminated.* This can not be a total explanation, however, since disabled beneficiaries (who are disproportionately high utilizers) account for approximately 15 percent of Medicare admissions in our

*The omission of most maternity-related and pediatric admissions in particular could make DRGs appear less powerful.

TABLE 4-6

VARIATION (R^2) IN HOSPITAL AND PHYSICIAN COSTS EXPLAINED BY DRGS

All Cases	New Jersey Untrimmed	New Jersey Trimmed[a]	North Carolina Untrimmed	North Carolina Trimmed[a]
All DRGs - Hospital	0.18	0.32	0.16	0.32
- Physician	0.57	0.70	0.57	0.75
Surgical DRGs - Hospital	0.31	0.48	0.33	0.51
- Physician	0.53	0.62	0.64	0.71
Medical DRGs - Hospital	0.06	0.11	0.04	0.09
- Physician	0.05	0.07	0.03	0.06

[a]Trimmed data exclude outliers, defined as cases exceeding three standard deviations from the geometric mean.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

two states. It also does not explain why DRGs do capture the majority of the variation in physician costs. Finally, since the hospital PPS (as well as a potential physician inpatient case reimbursement system) is designed for Medicare admissions, it is critical that DRGs explain a reasonable share of Medicare costs.

In order to better understand the relative performance of hospital and physician DRGs, we decomposed the sample and conducted analyses of variance for medical and surgical DRGs separately, also shown on Table 4-6. Here, we can see that virtually all of the explained variation in total physician and in hospital costs was due to surgical DRGs. The surgical DRGs account for one-third of the variation in (untrimmed) hospital costs for surgical admissions, and one-half to two-thirds of the variation in physician costs. By contrast, medical DRGs are unable to explain more than a small percent of costs for medical admissions. Even after eliminating outlier cases, 90 percent of the variation in hospital costs and almost 95 percent of the variation in physician costs for non-surgical cases remain unexplained.

What do these findings mean for DRG-based payment for inpatient physician services? For surgical admissions, they suggest that DRG payments should represent reasonable reimbursement for the costs incurred in treating those cases. For medical admissions, on the other hand, DRG-specific payments will bear no relationship to costs in most instances. Whether a physician wins or loses on any one case will be largely random. A single rate per medical case could conceivably do just as well. The ultimate test, however, is not whether physicians win or lose on a given admission, but whether they win or lose on average across all admissions. It is possible that random gains and losses on medical cases cancel each other out when aggregated across a physician's entire caseload. We examine this directly in Chapter 6. (This ignores of course the larger question of whether case reimbursement should be based on a flawed system, whatever the outcome.)

Our findings have the same implications for DRG-based payment for hospital services. Although gains and losses are more likely to cancel out due to the high volume of Medicare cases in most hospitals, whether a hospital wins or loses on any one medical admission may be largely a random event. In Chapter 7, we examine the potential impact of a combined A-B payment for hospitals.

5.0 PHYSICIAN DRGS DECOMPOSED

5.1 Overview

We examined average MD-DRG payments in the previous chapter but did not look at the physician services that make up those payments. In this chapter, we decompose physician DRGs, looking at the following questions:

(1) What is the range and mix of physician services associated with a DRG admission? How many different physicians are involved?

(2) How do physicians in New Jersey or North Carolina treat patients within the same DRG? Do differences in practice patterns contribute to payment differences, or are higher DRG costs in New Jersey simply due to cost-of-living differences?

(3) What impact does the specialty of the attending physician have on total DRG costs? Do certain specialties drive up costs because they charge higher fees or because they use more (or more expensive) inputs?

(4) To what extent can specialty mix explain within-DRG variation?

5.2 Geographic Variation in Treatment of Lens Procedures

Table 5-1 decomposes lens procedure costs and inputs for physician DRGs. The numbers in parentheses represent the relative frequency with which a physician component is included; a surgeon and anesthesiologist are necessary inputs for the performance of lens operations, but the use of assistant surgeons, consultants, and the like is discretionary. The total MD-DRG price is a weighted average of all physician costs for the inpatient stay.

The lens procedure DRG is a particularly interesting one because it is even more homogeneous than most surgical DRGs. Lens procedures are performed by physicians in a single specialty (ophthalmology), they are always elective, and they are generally one of two operations: cataract extraction, or extraction plus intraocular lens implant (over 95% of cases in both states). Given these factors, we might expect to observe few differences in practice patterns between the two states. In fact, however, care of lens procedure patients is far more service-intensive in New Jersey than in North Carolina. New Jersey ophthalmologists use an assistant surgeon in three out of every four operations, while North Carolina ophthalmologists almost never do. Patients in New Jersey are also far more likely to have non-surgeons involved

TABLE 5-1

GEOGRAPHIC VARIATION IN TREATMENT OF LENS PROCEDURES (DRG #39)[a]

	New Jersey	North Carolina
Surgeon	$1,283 (1.00)	$1,129 (1.00)
Anesthesiologist	233 (1.00)	121 (1.00)
Assistant Surgeon	260 (0.76)	222 (0.02)
Other Surgery[c]	560 (0.04)	400 (0.04)
Routine Hospital Visits	94 (0.60)	80 (0.05)
ICU Visits	86 (0.01)	123 (b)
Consultations	76 (0.43)	45 (0.11)
X-Rays	15 (0.89)	18 (0.75)
Other Tests	19 (0.87)	9 (0.71)
Total MDDRG Cost	$1,848	$1,300
Coefficient of Variation	(0.26)	(0.21)

[a]All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

[b]Frequency less than one percent.

[c]Includes charges by surgeons, assistant surgeons, and anesthesiologists.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

in their care, either as attendings providing routine visits (60% of cases versus only 5% in North Carolina) or as consultants (43% vs 11%). These routine visits are all in addition to the follow-up care that was to be provided by the ophthalmologist who performed the surgery. The result is an admission over $500 more expensive in New Jersey.

Of course, part of this large cost differential between lens procedures is due to legitimate cost-of-living differences between the two states. How much of the $548 can we attribute to price versus intensity differences? Unfortunately, no physician fee deflators exist at the state level. An alternative is to estimate what a lens procedure would cost if New Jersey ophthalmologists used other physician inputs at the same rate as their North Carolina colleagues. Using this approach, the expected cost per case is $1576 versus an actual cost in New Jersey of $1848. Thus, of the $548 cost differential between the two states, one-half ($272, or $1848-$1576) is due to higher prices in New Jersey and one-half ($276, or $1576-$1300) to greater service intensity. Most of the intensity differential can be attributed to higher use of assistant surgeons in New Jersey.

Why do New Jersey ophthalmologists use so many more services from other physicians? There is certainly no reason to believe lens procedure patients are any sicker in New Jersey. One possible explanation is that there are 35 percent more ophthalmologists per capita in New Jersey than in North Carolina.

5.3 Geographic Variation in Treatment of Heart Failure and Shock

Table 5-2 compares physician inputs for a medical DRG: heart failure and shock. Again, we observe greater intensity in New Jersey for virtually every category of physician service. New Jersey attendings order consults at twice the rate of their North Carolina colleagues, for example. We also see that there is more likely to be a second (and sometimes third) physician involved in New Jersey cases who is billing for routine, daily hospital visits along with the attending physician (25% of cases versus 16% in North Carolina). This is usually a GP-internist or internist-cardiologist combination.

If New Jersey physicians used other physician inputs at the same rate as those in North Carolina, the expected cost per case would be $494, compared with an actual cost of $574. This implies that only 35 percent of the $226 cost differential ($574-$348) between the two states is attributable to greater intensity with the remainder due to higher prices.

TABLE 5-2

GEOGRAPHIC VARIATION IN TREATMENT OF HEART FAILURE AND SHOCK (DRG #127)[a]

	New Jersey	North Carolina
Routine Hospital Visits-Attending MD	$257 (1.00)	$192 (1.00)
Routine Hospital Visits-Other MDs	104 (0.25)	87 (0.16)
ICU Visits	167 (0.25)	123 (0.21)
Consultations	110 (0.41)	65 (0.19)
Diagnostic Surgery[b]	320 (0.13)	258 (0.10)
X-Rays	66 (0.98)	55 (0.97)
Other Tests	103 (0.95)	31 (0.80)
Total MDDRG Cost	$574	$348
Coefficient of Variation	(0.84)	(0.94)

[a]All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

[b]Includes charges by surgeons, assistant surgeons, and anesthesiologists.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

Of course, higher prices in New Jersey may be due not only to geographic cost-of-living differences but may also reflect differences in the specialty mix treating this DRG. We know, for example, that 37 percent of heart failure cases in North Carolina are treated by general and family practitioners versus only 19 percent in New Jersey. To the extent that GPs/FPs are paid less than specialists for the same services, this could explain lower costs in North Carolina, especially for routine hospital visits. In section 5.5, we look specifically at specialty treatment differences within DRG.

5.4 Differential Use of Physician Inputs

Lens procedures and heart failure are only two of 467 DRGs. Have we inadvertently picked two extreme cases for comparison between the two states? The answer is no; New Jersey physicians consistently use more inputs from other physicians, regardless of DRG. Table 5-3 compares consultation rates (number of consultations per admission) for our entire subgroup of high volume DRGs. New Jersey attendings request consultations 2-3 times as often as their North Carolina colleagues.

Relative differences across DRGs within each state tend to be similar, however, with lower consultation rates for less complicated DRGs like angina and diabetes and higher rates for pacemaker implants and major bowel procedures. This suggests that medical practice in New Jersey is not different from that in North Carolina because physicians choose to treat some DRGs more intensively, but rather because their entire style of practice is more resource-intensive. This also provides supportive evidence for the face validity of DRGs across states.

Table 5-4 examines the use of assistant surgeons in the two states. Because our original group of high volume DRGs includes only 12 surgical DRGs, we present an additional 11 surgical DRGs here for comparison purposes. Again, we observe a consistently greater propensity on the part of New Jersey surgeons to use an assistant. The differential is greatest for those DRGs where an assistant surgeon is most discretionary, i.e. in the relatively simpler surgical cases such as lens procedures (DRG 39), pacemaker implants (DRGs 115, 116), and hernia repairs (DRGs 161,162).

Finally, Table 5-5 compares hospital visit rates across the two states. These visits include not only those made by the attending physicians but also those provided by any other physicians. (ICU visits are also included.) New Jersey patients receive more visits per admission than do similar patients in

TABLE 5-3

GEOGRAPHIC VARIATION IN CONSULTATIONS PER ADMISSION BY DRG

DRG		New Jersey	North Carolina
14	Specific Cerebrovasc Dis exc TIA	1.12	0.42
15	Transient Ischemic Attacks	0.84	0.36
16	Nonspecific Cerebrovasc Dis w/ CC	1.00	--
17	Nonspecific Cerebrovasc Dis w/o CC	0.87	0.37
39	Lens Procedures	0.47	0.12
89	Pneumonia Age 70+ &/or CC	0.67	0.20
90	Pneumonia Age 18-69 w/o CC	0.65	0.19
115	Perm Pacemaker Implant w/AMI or CHF	1.48	0.69
116	Perm Pacemaker Implant w/o AMI or CHF	1.35	0.57
127	Heart Failure & Shock	0.59	0.26
132	Atherosclerosis Age 70+ &/or CC	0.68	0.24
133	Atherosclerosis Age < 70 w/o CC	0.75	0.23
140	Angina Pectoris	0.43	0.16
148	Major Bowel Procs Age 70+ &/or CC	1.51	0.64
149	Major Bowel Procs Age < 70 w/o CC	1.38	0.49
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	0.72	0.30
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	0.72	0.33
195	Cholecystectomy w/CDE Age 70+ &/or CC	1.17	0.49
196	Cholecystectomy w/CDE Age < 70 w/o CC	0.98	0.43
197	Cholecystectomy w/o CDE Age 70+ &/or CC	1.11	0.44
198	Cholecystectomy w/o CDE Age < 70 w/o CC	0.80	0.38
209	Major Joint Procedures	1.12	0.64
294	Diabetes Age 36+	0.66	0.29
336	Transurethral Prostatectomy Age 70+ &/or CC	0.91	0.44
337	Transurethral Prostatectomy Age < 70 w/o CC	0.71	0.35

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

TABLE 5-4

GEOGRAPHIC VARIATION IN USE OF ASSISTANT SURGEONS BY DRG (Percent of Admissions)

DRG		New Jersey	North Carolina
5	Extracranial Vascular Procedures	57.3%	31.7%
39	Lens Procedures	75.6	2.3
110	Major Reconstruct Vasc Procs Age 70+ &/or CC	61.9	45.5
111	Major Reconstruct Vasc Procs Age < 70 w/o CC	55.7	53.0
115	Perm Pacemaker Implant w/AMI or CHF	23.8	2.1
116	Perm Pacemaker Implant w/o AMI or CHF	29.6	2.2
148	Major Bowel Procs Age 70+ &/or CC	55.0	41.7
149	Major Bowel Procs Age < 70 w/o CC	60.5	46.9
161	Inguinal/Femoral Hernia Procs Age 70+ &/or CC	42.9	17.0
162	Inguinal/Femoral Hernia Procs Age 18-69 w/o CC	37.8	14.7
195	Cholecystectomy w/CDE Age 70+ &/or CC	56.2	49.4
196	Cholecystectomy w/CDE Age < 70 w/o CC	60.7	51.6
197	Cholecystectomy w/o CDE Age 70+ &/or CC	61.0	47.9
198	Cholecystectomy w/o CDE Age < 70 w/o CC	59.6	45.5
209	Major Joint Procedures	51.4	56.6
210	Hip & Femur Procs Exc Major Joint Age 70+ &/or CC	41.6	14.5
211	Hip & Femur Procs Exc Major Joint Age 18-69 w/o CC	38.5	14.8
257	Total Mastectomy for Malig Age 70+ &/or CC	45.3	36.3
258	Total Mastectomy for Malig Age < 70 w/o CC	43.5	35.1
336	Transurethral Prostatectomy Age 70+ &/or CC	4.0	0.6
337	Transurethral Prostatectomy Age < 70 w/o CC	1.9	0.5
354	Nonradical Hysterectomy Age 70+ &/or CC	50.9	42.4
355	Nonradical Hysterectomy Age < 70 w/o CC	43.2	43.5

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

TABLE 5-5

NUMBER OF ROUTINE HOSPITAL VISITS BY DRG: NEW JERSEY AND NORTH CAROLINA

DRG		New Jersey		North Carolina	
		Per Admission	Per Day	Per Admission	Per Day
14	Specific Cerebrovasc Dis exc TIA	18.1	0.95	15.5	0.96
15	Transient Ischemic Attacks	11.2	1.03	7.9	1.02
16	Nonspecific Cerebrovasc Dis w/ CC	16.1	0.95	--	--
17	Nonspecific Cerebrovasc Dis w/o CC	12.8	1.04	11.7	1.01
39	Lens Procedures	1.4	0.34	0.2	0.06
89	Pneumonia Age 70+ &/or CC	14.7	1.01	12.3	1.01
90	Pneumonia Age 18-69 w/o CC	12.2	1.04	10.5	1.02
115	Perm Pacemaker Implant w/AMI or CHF	28.2	1.39	18.0	1.15
116	Perm Pacemaker Implant w/o AMI or CHF	15.6	1.09	16.2	1.37
127	Heart Failure & Shock	13.5	1.01	11.3	1.03
132	Atherosclerosis Age 70+ &/or CC	12.6	1.03	10.8	1.01
133	Atherosclerosis Age <70 w/o CC	11.8	1.05	8.4	1.01
140	Angina Pectoris	10.0	1.02	7.9	1.02
148	Major Bowel Procs Age 70+ &/or CC	19.3	0.82	10.4	0.52
149	Major Bowel Procs Age <70 w/o CC	15.7	0.77	6.5	0.39
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	10.8	1.03	8.4	1.01
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	9.4	1.02	7.6	1.01
195	Cholecystectomy w/CDE Age 70+ &/or CC	15.9	0.79	9.5	0.56
196	Cholecystectomy w/CDE Age <70 w/o CC	10.5	0.62	6.5	0.44
197	Cholecystectomy w/o CDE Age 70+ &/or CC	15.7	0.99	7.1	0.52
198	Cholecystectomy w/o CDE Age < 70 w/o CC	7.2	0.60	5.0	0.44
209	Major Joint Procedures	14.0	0.62	3.5	0.20
294	Diabetes Age 36+	13.4	1.01	10.5	1.00
336	Transurethral Prostatectomy Age 70+ &/or CC	8.1	0.68	3.3	0.32
337	Transurethral Prostatectomy Age <70 w/o CC	4.7	0.49	2.3	0.26

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

North Carolina, with the biggest differences for surgical DRGs. Patients undergoing major joint procedures (DRG 209) in New Jersey, for example, receive 14 visits versus only 3 1/2 in North Carolina. Apparently, North Carolina surgeons are more likely to provide all routine hospital care themselves, without bringing in a medical specialist. (Since this care is packaged in their fee for the surgery itself, it does not show up as separate visit bills.)

Because New Jersey patients stay in the hospital longer, they will have more visits for this reason alone. (Whether longer stays are warranted in the first place is another question.) In order to disentangle the length of stay effect from a pure intensity effect, we also calculated the number of visits per hospital day. Surprisingly, there are practically no differences in the per diem visit rates for medical DRGs. Medical patients in both states receive approximately one visit every day they are hospitalized, exactly what we would have expected. The same is not true for surgical DRGs. Even holding length of stay constant, surgical patients in New Jersey receive many more visits than do comparable North Carolina patients.

5.5 Specialty Differences in DRG Treatment

At least some of the large within-DRG variation observed for medical admissions may be explained by the specialty of the attending physician. Not only do specialists charge higher fees than general practitioners, but they may also use more (or more expensive) inputs in the treatment of similar cases. Table 5-6 compares the treatment of angina pectoris by general and family practitioners (GPs/FPs), internists, and cardiologists. The mix of specialties is clearly different across the two states. One out of every five hospitalized angina patients in New Jersey is treated by a cardiologist, compared with fewer than one of twenty in North Carolina. Care in North Carolina is much more likely to be provided by a general or family practitioner. These differences simply reflect the underlying distribution of physicians in each state; compared with North Carolina, New Jersey has twice as many cardiologists per capita, 53 percent more internists, and 29 percent fewer GPs.

Within New Jersey, there is surprisingly little difference in the total costs of treating angina, only about $20 more when the attending physician is a specialist. Higher fees charged by internists and cardiologists appear to be largely offset by the greater propensity of GPs/FPs to order consultants

TABLE 5-6

DIFFERENCES IN TREATMENT OF ANGINA PECTORIS (DRG #140): ACROSS SPECIALTY AND ACROSS STATES[a]

	New Jersey[b]			North Carolina[b]		
	GP/FP (15%)	Internist (58%)	Cardiologist (20%)	GP/FP (32%)	Internist (62%)	Cardiologist (4%)
Routine Hospital Visits-Attending MD	$ 171 (1.00)	$ 195 (1.00)	$ 191 (1.00)	$ 119 (1.00)	$ 158 (1.00)	$ 174 (1.00)
Routine Hospital Visits-Other MDs	75 (0.32)	80 (0.16)	85 (0.14)	64 (0.09)	70 (0.16)	62 (0.21)
ICU Visits	131 (0.29)	144 (0.41)	137 (0.49)	62 (0.30)	78 (0.35)	128 (0.34)
Consultations	97 (0.57)	98 (0.30)	94 (0.25)	56 (0.12)	60 (0.11)	64 (0.17)
Diagnostic Surgery[c]	316 (0.06)	322 (0.05)	319 (0.06)	162 (0.03)	181 (0.05)	570 (0.10)
X-Rays	54 (0.95)	54 (0.96)	56 (0.96)	34 (0.92)	42 (0.92)	55 (0.94)
Other Tests	79 (0.95)	93 (0.95)	93 (0.96)	31 (0.76)	42 (0.93)	58 (0.97)
Total MDDRG Cost	$ 434	$ 453	$ 456	$ 209	$ 290	$ 404
Coefficient of Variation	0.70	0.77	0.62	0.68	0.62	1.23
Length of Stay	9.7	9.9	9.6	7.5	7.7	8.3

[a]All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

[b]Specialties shown treat 93% of New Jersey angina cases and 98% of North Carolina cases.

[c]Includes charges by surgeons, assistant surgeons, and anesthesiologists, all procedures.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

and to include other physicians in routine patient care. By contrast, there are marked specialty differences across North Carolina physicians, with internists costing 39 percent more than GPs and FPs to treat angina, and cardiologists 93 percent more. These higher costs are partly due to their higher fees, but even more important is the greater frequency of diagnostic surgery. North Carolina cardiologists order or perform some kind of diagnostic surgical procedure in one out of every ten angina cases they treat and internists do so 5 percent of the time (the same rate as New Jersey internists), while GPs/FPs almost never do. There are no specialty differences in surgery rates across New Jersey physicians. One explanation is that, because of the relatively scarce supply of specialists in North Carolina, there may be more triaging of patients (either formally or informally). Specialists, especially cardiologists, may be more likely to receive the sicker patients, or patients who are in the initial evaluative phase of their illness.

Table 5-7 presents a similar comparison for DRG 89: pneumonia with patient age 70+ and/or with complicating conditions. Again, we observe the concentration of GPs/FPs in North Carolina and the more diverse specialty mix in New Jersey. Total MD-DRG costs of pneumonia in New Jersey definitely vary in this case by specialty, ranging from $512 for a general or family practitioner to $846 for a pulmonary disease specialists. These differences appear to be largely due to length of stay differences, with specialists keeping their patients in the hospital longer. This may reflect triaging of more seriously ill patients to specialists, especially to the pulmonary disease experts who also perform more diagnostic surgery. If so, the New Jersey GP is treating a simpler pneumonia patient much more intensively then his colleague in North Carolina who probably is seeing a broader range of severity. Cardiologists, however, seem to treat pneumonia patients much like internists do, implying similar severity of illness.

Although North Carolina internists do not keep their pneumonia cases any longer in the hospital than do their GP colleagues, they do charge higher fees and use more inputs from other physicians. Total MD-DRG costs for North Carolina internists are 40 percent higher than for GPs/FPs. Interestingly, internists in both states generate an additional $100 in costs compared with GPs/FPs, but because the GP/FP cost base is so much higher in New Jersey, internists there raise pneumonia treatment costs by only 19 percent.

TABLE 5-7

DIFFERENCES IN TREATMENT OF PNEUMONIA (DRG #89): ACROSS SPECIALTY AND ACROSS STATES[a]

	New Jersey[b]				North Carolina[b]	
	GP/FP (23%)	Internist (58%)	Cardiologist (6%)	Pulm. Spec. (4%)	GP/FP (47%)	Internist (48%)
Routine Hospital Visits-Attending MD	$ 250 (1.00)	$ 302 (1.00)	$ 318 (1.00)	$ 341 (1.00)	$ 177 (1.00)	$ 234 (1.00)
Routine Hospital Visits-Other MDs	96 (0.33)	115 (0.26)	133 (0.29)	177 (0.32)	76 (0.10)	97 (0.17)
ICU Visits	161 (0.08)	190 (0.11)	182 (0.17)	219 (0.21)	125 (0.05)	131 (0.10)
Consultations	113 (0.51)	117 (0.41)	128 (0.45)	130 (0.52)	55 (0.13)	64 (0.17)
Diagnostic Surgery[c]	311 (0.14)	315 (0.20)	330 (0.16)	355 (0.37)	153 (0.07)	165 (0.13)
X-Rays	63 (0.92)	69 (0.99)	74 (0.99)	98 (0.99)	44 (0.98)	55 (0.98)
Other Tests	58 (0.92)	84 (0.91)	88 (0.91)	116 (0.92)	14 (0.58)	18 (0.75)
Total MDDRG Cost	$ 512	$ 609	$ 653	$ 846	$ 260	$ 364
Coefficient of Variation	0.81	0.86	0.88	1.03	0.71	0.76
Length of Stay	13.8	14.6	14.9	17.0	12.2	12.2

[a]All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

[b]Specialties shown treat 91% of New Jersey pneumonia cases and 95% of North Carolina cases. Cardiologists and pulmonary disease specialists each accounted for only 1% of North Carolina cases, and thus were too few to be shown separately.

[c]Includes charges by surgeons, assistant surgeons, and anesthesiologists, all procedures.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

5.6 Can Specialty Mix Explain Within-DRG Variation?

The preceding tables illustrate some specialty differences in the treatment of angina and pneumonia, although they are not always as marked as we might have expected. How much of the tremendous variation in medical DRGs can we explain based on the specialty of the attending physician? Table 5-8 summarizes the percent of variation explained (R-squares) for each of our medical DRG groups. Because certain specialties may be disproportionately represented in one of several related DRGs (e.g., specific cerebrovascular disease vs. transient ischemic attack), we held the specific DRG constant in our regression analysis.

The specialty of the attending physician explains surprisingly little of the variation in treatment costs, virtually none (less than 2%) in New Jersey and 4-9 percent in North Carolina. This implies that DRG reimbursement by specialty might not be much more equitable on average than a single all-specialty payment. Physician DRG costs may have more to do with where the patient is being treated (e.g., in a teaching vs. non-teaching hospital) than with who is treating him, a possibility we explore in Chapter 7.

Why is specialty a superior predictor of costs in North Carolina than in New Jersey? It would seem that specialty roles are more clearly defined in North Carolina and hence differences in patients and practice styles are sharper. Undoubtedly, this is due to the relatively smaller number of specialists in North Carolina, especially medical sub-specialists such as cardiologists and gastroenterologists. As a result, more triaging is done, and the angina patient who sees a cardiologist or the the pneumonia patient who sees a pulmonary disease specialist, etc., is probably sicker than patients in the same DRG who are treated by a general or family practitioner. In New Jersey, on the other hand, with its relative abundance of specialists, the specialty lines are blurred. Cardiologists, for example, may not be able to keep their caseloads filled with more seriously ill cardiac patients, or even with cardiac patients exclusively. They thus end up treating a more varied range of patients much like internists do. New Jersey cardiologists, beside caring for 6% of pneumonia patients, also are responsible for 4.5% of gastroenteritis admissions and 5% of diabetes cases.

TABLE 5-8

PERCENT OF WITHIN-DRG PHYSICIAN COST VARIATION EXPLAINED BY SPECIALTY OF ATTENDING PHYSICIAN[a]

DRG		New Jersey	North Carolina
14-17	Cerebrovascular Disorders	1.1%	7.4%
89-90	Pneumonia	1.7	3.8
127	Heart Failure and Shock	1.6	4.3
132-133	Atherosclerosis	0.8	8.9
140	Angina Pectoris	0.7	4.0
182-183	Gastroenteritis and Misc. Disorders	1.6	4.7
294	Diabetes	1.1	4.0

[a]Dummy variables were used to hold specific DRGs constant for those conditions encompassing two or more DRGs.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

6.0 DISTRIBUTIONAL EFFECTS OF MD-DRGs ON ATTENDING PHYSICIANS

6.1 Overview

Any case payment approach like physician DRGs involves some sort of averaging. It is assumed that some cases will require more physician services and some cases will require less, but that on average the DRG price is a reasonable reimbursement for the services provided. This assumption may not be valid, however, if certain types of physicians are consistently over or under the mean holding DRG mix constant. Are serious inequities or inefficiencies introduced when we pay based on DRG averages?

In the preceding chapters, we found tremendous within-DRG variation, especially for medical DRGs. This suggests that physicians would end up being significantly under or overpaid in a large number of cases. From the individual physician's perspective, gains or losses on any one case may be less important than gains or losses for the DRG as a whole, and particularly for his/her practice as a whole. Do winning and losing admissions cancel each other out, leaving the physician's total Medicare revenues unchanged? To examine this, we must aggregate individual cases to the attending physician level. The purpose of this chapter is to simulate the distributional effects of MD-DRG reimbursement on attending physicians, that is, who the winners and lossers would be if payment were made directly to attendings. (Potential effects of alternative payment modes are analyzed in the next chapter.) Specifically, we examine the following questions:

(1) How many physicians are winners (with actual costs less than the DRG average) and how many are losers (actual costs greater than the DRG average)? Do losers account for a disproportionate share of total admissions?

(2) How does the distribution of winning and losing physicians vary by specialty?

(3) Does it make any difference if all medical DRGs are reimbursed at a single, global rate?

(4) How are winning and losing DRGs distributed across physicians? To what extent do they cancel out, leaving total practice revenues unaffected?

(5) What are the sources of loss? Do attending physicians "lose money" on a DRG because their fees are higher or because they use more inputs? What role does interspecialty competition play?

6.2 Methods

6.2.1 Construction of Physician Aggregates

In order to identify how individual physicians would be affected by DRG payment, we created an analytic file with the physician rather than the hospital admission as the unit of observation. This was done by aggregating all cases with the same provider number for the attending physician.* This yielded 6,923 physicians in New Jersey and 5,233 in North Carolina. The first and third columns of Table 6-1 present a frequency distribution of these physicians by specialty. This table does not represent the specialty distribution for all physicians in each state, but rather for all physicians admitting Medicare patients to the hospital. Because the distributions are unweighted by the volume of admissions, we see a surprising number of specialists like OB-GYNs and psychiatrists who do not generally treat Medicare patients. The second and fourth columns of Table 6-1 are weighted, and not surprisingly we see that internists admit a disproportionately large share of patients.

In constructing the physician aggregates, DRG-specific detail on patient mix and practice style was retained on the 20 most frequent DRGs for each physician. (About 35-40 percent of physicians admitted patients in more than 20 unique DRGs). This detail enabled us to determine whether losses on one DRG are offset by gains on another and also to decompose the reasons for loss. In addition, a summary measure of casemix was created based on the physician's entire practice. The casemix index (CMI) was based on the

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*To the extent that group physicians of the same specialty share a provider number, we will underestimate the number of unique physicians. Since these physicians must charge the same fees to Medicare (for similar procedures) and may also share a similar practice style, this should not bias our results in any way. Gains and losses, furthermore, are unaffected.

TABLE 6-1

SPECIALTY DISTRIBUTION OF PHYSICIANS AND ADMISSIONS[a]

	New Jersey		North Carolina	
	Physicians	Admissions	Physicians	Admissions
Family Practitioners	5.8%	4.8%	4.3%	3.0%
General Practitioners	9.1	7.7	14.8	21.7
Cardiologists	3.7	6.3	1.3	1.6
Gastroenterologists	2.1	2.3	0.7	0.5
Internists	23.1	38.3	25.9	37.3
Pulmonary Disease Specialists	1.3	1.7	0.7	0.7
Other Medical Specialists	0.8	0.4	1.7	0.4
General Surgeons	15.1	13.0	13.6	13.2
Neurosurgeons	1.4	0.7	1.7	1.3
OB-GYNs	6.6	1.1	8.1	1.2
Ophthalmologists	5.3	4.4	5.5	5.3
Orthopedic Surgeons	6.5	5.2	5.8	4.5
Otolaryngologists	2.5	0.8	2.8	0.7
Plastic Surgeons	1.3	0.3	1.1	0.3
Thoracic Surgeons	2.8	1.8	0.8	0.5
Urologists	5.5	6.0	4.1	4.8
Other Surgical Specialists	0.4	0.2	0.1	0.0
Neurologists	1.5	1.0	1.9	1.3
Psychiatrists	2.2	0.7	3.7	1.1
Other Specialists	1.5	0.2	0.9	0.2
Multi-Specialty Groups	1.6	3.0	0.6	0.1

[a]Columns may not sum to 100% due to rounding.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

relative costs for each physician DRG, weighted by that DRG's share of the physician's caseload, as follows:

$$CMI_j = \sum_i \left[\left(\frac{MDCOST_i}{\sum_i MDCOST} \right) * \left(\frac{DRG_{ij}}{\sum_i DRG_j} \right) \right]$$

where $MDCOST_i$ = average physician costs for the i-th DRG, and DRG_{ij} = the number of cases in the i-th DRG for the j-th physician. The index is standardized to 1.0, so that scores greater than (less than) one represent physician practices of above (below) average casemix complexity, relative to the "typical" practice in the state.

6.2.2 Defining Winners and Losers

Winners and losers under DRG-based reimbursement were simulated by comparing physician costs for each case in a given DRG with the DRG average and then cumulating gains and losses across all cases and DRGs to arrive at a total gain (or loss). Let

$$Gain_j = \sum_{ik} \left(\bar{P}_i - MDCOST_{ijk} \right)$$

$Gain_j$ be the total gain or loss for the j-th physician, $\bar{P}_i$ = average price (reimbursement) for the i-th DRG and $MDCOST_k$ = physician costs for the k-th case. The value for $\bar{P}_j$ was based on mean physician DRG costs in urban and rural areas for each state.* If $Gain_j$ is greater than zero, then the physician is a winner, i.e., his/her costs exceeded the reimbursement on average.

Total gains and losses will be a function not only of physician practice styles, but also of the total size of practice. Dividing $Gain_j$ by N_j (the j-th physician's caseload), we obtain gains (or losses) on a per case basis. Since this is the more appropriate measure for cross-physician comparisons, most of our discussion will focus on per case gains and losses. Nevertheless, total practice gains and losses are still of interest in their own right, as they illustrate the absolute size of the income redistribution across physicians.

*Alternatively, a single statewide average could have been used. We chose urban-rural as a more realistic stratifier given that this distinction is also made under the hospital PPS. Making an urban-rural adjustment also helps control for geographic cost-of-living differences.

6.3 Who Wins, Who Loses, and By How Much?

6.3.1 Per Case Gains and Losses

Under DRG-based case reimbursement, even with an urban-rural differential, the average physician would lose money, $13 per case in New Jersey and $19 in North Carolina. While the variation is tremendous, ranging from gains of $3,700 per admission to losses of over $6,000, most physicians would experience more modest revenue changes. One-half of attending physicians in New Jersey and two-thirds of those in North Carolina would receive $150 more or less than their average cost (see Table 6-2). These gains (losses) would appear quite small relative to the average DRG payments of $1,457 and $1,012 in New Jersey and North Carolina, respectively.

Does this mean that only relatively small changes in case management would be necessary for physicians to break even on average? The answer is no, for two reasons. First, in the case of surgical DRGs, a loss even of $150 is fairly small compared to the total MD-DRG costs (less than 10%). A similar dollar loss on medical admissions, on the other hand, would constitute 30-50 percent of the total cost of care and an offset presumably would require major changes in treatment patterns. Second, a small but substantial proportion of physicians (24% and 18% in New Jersey and North Carolina respectively) would be "big" losers, incurring losses greater than $150 on every patient they admit.

Losers, of course, are only half the story. For policy purposes, we are also interested in winners, physicians spending far less on treatment than the DRG reimbursement they would receive. In fact, there are roughly the same proportion of big winners as big losers in each state. If these gains are due to better case management then the windfall is a short-run (assuming recalibration) reward for efficiency. If, on the other hand, their cases are less seriously ill, then the windfalls could introduce substantial inequities, particularly if within-DRG severity varied systematically by specialty.

Both big winners and big losers account for a disproportionately small share of total admissions. Together, they represent 50 percent of New Jersey attending physicians and 34 percent of North Carolina physicians, but admit only 39 percent and 21 percent of cases, respectively (see Table 6-2).*

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*The larger number of big winners and big losers in New Jersey is simply an artifact of that state's higher MD-DRG costs which produces a larger absolute variance.

TABLE 6-2

COMPARISON OF PER CASE WINNERS AND LOSERS[a]

	New Jersey		North Carolina	
	Physicians	Admissions	Physicians	Admissions
Big Winners ($150+)	26.2%	20.8%	15.8%	9.1%
Small Winners ($50-150)	18.0	22.2	25.7	30.1
Break Even (± $50)	18.6	23.3	26.0	33.7
Small Losers ($-50-150)	13.4	15.2	14.6	15.0
Big Losers ($-150+)	23.9	18.6	17.7	11.7

[a]Columns may not sum to 100 percent due to rounding.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

6.3.2 Total Practice Gains and Losses

While we are primarily concerned in gains and losses standardized for size of caseload, gains and losses for the practice as a whole are also of interest. A per case loss of $100 will clearly have different financial implications for the physician who admits two patients per year than for the physician with an annual volume of 200 patients.

Figure 6-1 displays the frequency distributions of per case and total gains and losses for New Jersey physicians. Both measures of gain (loss) are fairly normally distributed around the mean of zero (the break-even point). Although total gains (losses) are not as tightly distributed around the mean as per case gains and losses, there is no marked skew in either direction.

The size distribution of total gains and losses is also shown in Table 6-3. One-fourth of New Jersey physicians and nearly one-third of those in North Carolina do not win or lose more than $1,000. This may be due either to small per case gains (losses) or to small caseloads. About half the physicians in both states are within $3,000 of their total costs. Nevertheless, the absolute dollar gain or loss can be considerable for some physicians. Roughly 5 percent of physicians in both states would lose more than $15,000 annually under DRG reimbursement (and almost 2% would incur losses over $25,000). Windfall gains in excess of $15,000 would be realized by almost as many physicians (3.5% - 4.6%).

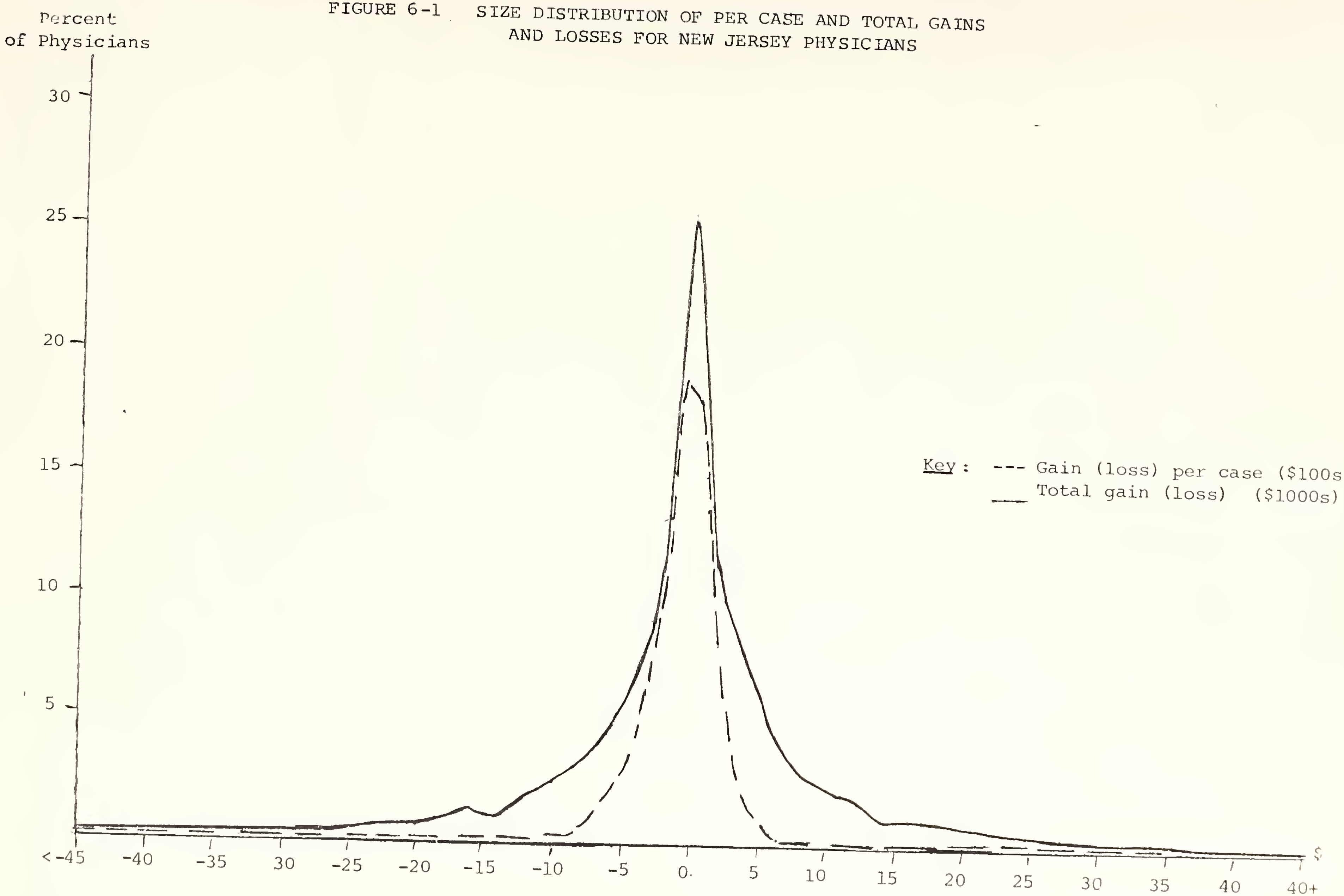
6.4 Differential Impact by Specialty

Average per case losses of $13 and $19 in our two states hide the fact that some specialties may incur far greater losses and that other specialties may actually make money. Since these differential impacts may greatly influence access by Medicare beneficiaries to specialized services, they are probably more important than distributional effects more generally. It is conceivable that every physician in a given specialty could lose, for example, especially among the more esoteric subspecialties.

6.4.1 Overview of Hospital Caseloads, DRG Concentration, and Casemix

Before simulating the specialty impacts of DRG payment, we need to have a frame of reference for analyzing those gains and losses. Which specialties have larger Medicare inpatient loads? Do some concentrate their practice in a

FIGURE 6-1 SIZE DISTRIBUTION OF PER CASE AND TOTAL GAINS AND LOSSES FOR NEW JERSEY PHYSICIANS



Source: New Jersey Part B claims, 1982.

TABLE 6-3

FREQUENCY DISTRIBUTION OF TOTAL GAINS AND LOSSES[a]

	New Jersey	North Carolina
G $15,000+	4.6%	3.5%
G $13,000-15,000	1.4	1.5
G $11,000-13,000	1.6	1.4
G $ 9,000-11,000	2.0	2.5
G $ 7,000- 9,000	3.0	3.3
G $ 5,000- 7,000	4.9	4.9
G $ 3,000- 5,000	7.8	7.5
G $ 1,000- 3,000	13.2	13.2
Break-Even (+$1000)	25.4	31.1
L $ 1,000- 3,000	10.0	9.0
L $ 3,000- 5,000	6.2	6.3
L $ 5,000- 7,000	4.5	3.6
L $ 7,000- 9,000	3.1	3.0
L $ 9,000-11,000	2.5	1.9
L $11,000-13,000	1.9	1.3
L $13,000-15,000	1.1	1.1
L $15,000+	5.5	4.9

[a]Columns may not sum to 100 percent due to rounding.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

narrow range of DRGs? How does casemix vary by specialty? Table 6-4 compares the major specialty groups along all three of these dimensions.

As we would expect, internists, cardiologists and North Carolina GPs have higher than average caseloads, about 65 Medicare admissions annually. Similarly, OB-GYNs, otolaryngologists, plastic surgeons, and psychiatrists admit relatively fewer Medicare patients.

The average physician admits only a little over two patients (2.2-2.4) in the same DRG, treating 18 different DRGs in the course of a year. Only ophthalmologists are able to concentrate their practice, admitting 10-13 patients per DRG. Given the narrow scope of their specialty, this is not particularly surprising, but what is surprising is the apparent DRG diversity of certain other "super" specialists like neurosurgeons and cardiologists. This implies that little physician averaging can take place at the DRG level; instead, any cancelling out will have to occur across DRGs.

Finally, the Casemix Index (CMI) scores vary from a low (less complex) of around 0.6 for general and family practitioners to a high of 2.5-3.6 for thoracic surgeons. Since the index was based on relative cost weights, surgeons as a group will tend to have higher scores (reflecting the higher costs associated with surgical DRGs). It is surprising, however, that we observe no real differences between GPs and internists, and small differences for cardiologists. This is partly because specialty cost differences were ignored in constructing the CMI, and hence an angina case, for example, has the same relative complexity or costliness for the GP as for the cardiologist. However, if cardiologists concentrated their practice in the most complicated DRGs, such as circulatory disorders with cardiac catheterizations, then the CMI should capture this difference.

How well does the Casemix Index capture variations in average costs per case across physicians? Based on regression analysis, the CMI explains 38 percent of per case costs in New Jersey and 49 percent in North Carolina, somewhat less than the variation explained by DRGs at the admission level (recall R^2s equal to 0.57 in Table 4-6). Greater explanatory power for the CMI in North Carolina than in New Jersey is consistent with similar analyses at the individual case level in Chapter 4. What does this imply for DRG payment to attending physicians? It means that average costs, and hence average gains or losses per case, will be largely determined by factors other than casemix (at least as measured by DRGs). In the next section, we look directly at winning and losing specialties.

TABLE 6-4

MEDICARE HOSPITAL CASELOADS, DRG CONCENTRATION, AND CASEMIX BY SPECIALTY

	New Jersey			North Carolina		
	Caseloads	Adm/DRG	CMI	Caseloads	Adm/DRG	CMI
Family Practitioners	32.5	1.7	0.61	31.9	1.7	0.58
General Practitioners	33.4	1.8	0.64	66.5	2.2	0.58
Cardiologists	66.7	2.6	0.70	57.5	2.7	0.76
Gastroenterologists	43.5	2.1	0.95	27.9	2.0	1.11
Internists	65.3	2.3	0.64	65.5	2.3	0.66
Pulmonary Disease Specialists	49.0	2.3	0.69	42.9	2.4	0.76
General Surgeons	33.5	2.0	1.61	43.4	2.1	1.88
Neurosurgeons	19.7	1.9	2.16	32.9	2.3	1.95
OB-GYNs	6.0	1.7	1.33	6.3	1.8	1.52
Ophthalmologists	31.6	9.8	1.80	44.0	12.6	2.01
Orthopedic Surgeons	31.2	2.4	1.64	33.9	3.0	1.83
Otolaryngologists	12.4	1.9	1.37	11.8	2.0	1.55
Plastic Surgeons	10.5	1.7	1.39	10.4	1.9	1.77
Thoracic Surgeons	25.7	2.5	2.53	26.2	2.2	3.56
Urologists	42.5	2.8	1.47	53.4	3.3	1.72
Neurologists	24.2	1.9	0.71	31.4	2.1	0.62
Psychiatrists	13.4	3.5	0.81	13.5	2.8	0.60
All Physicians	38.7	2.2	1.14	44.3	2.4	1.13

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

6.4.2 Redistributive Effects Across Specialties

There are definite redistributive effects by specialty from a fixed, urban-rural DRG payment (Table 6-5). GPs and FPs experience substantial windfall gains ($46 to $74 per case), largely because of their lower fees. OB-GYNs, ophthalmologists, North Carolina otolaryngologists, and New Jersey psychiatrists also make money on each admission, although the absolute dollars tend to be smaller. Who are the big losers? They include the medical subspecialists (cardiologists, gastroenterologists, and pulmonary disease specialists), some of the higher priced surgical specialists (neuro, plastic, and thoracic surgeons), and neurologists.

Gains and losses for all of the specialty groups are significantly different from those incurred by GPs and FPs (based on regression analysis). The only exceptions are New Jersey ophthalmologists and New Jersey psychiatrists whose net wins per case are no different from those of their GP colleagues. Surprisingly, specialty explains very little of the variation in physician gains and losses, only 3.6 percent and 5.7 percent in New Jersey and North Carolina, respectively. There is clearly far more variation in winners and losers <u>within</u> specialty than <u>between</u> specialties. This is the focus of section 6.5.

How can we explain these specialty differences? Why does the ophthalmologist and the GP win on average and the general surgeon and the internist lose? The main reason probably lies in the degree of within-DRG competition among specialties. GPs, FPs, internists, and medical subspecialists all admit patients in the same DRGs, and the GPs/FPs are simply less expensive. The larger losses incurred by internists and medical specialties in North Carolina are probably due to the relatively greater concentration of GPs/FPs in that state. By contrast, ophthalmologists "control" the DRGs they deal with; there is virtually no between-specialty competition in the treatment of eye disorders. Whether an ophthalmologist wins or loses is thus primarily a function of how he/she treats patients relative to other ophthalmologists. Similarly, OB-GYNs, otolaryngologists, urologists, and (to a lesser extent) orthopedic surgeons are the chief specialties involved in their respective diagnostic categories, especially for the surgical DRGs. (Medical specialists may admit and care for patients with kidney and urinary tract diseases, for example, but only the urologists operate on them.)

TABLE 6-5

COMPARISON OF WINNERS AND LOSERS BY SPECIALTY ($ Per Case)

	New Jersey	North Carolina
Family Practice	$ 59	$ 46
General Practice	74	66
Cardiology	(69)	(230)
Gastroenterology	(132)	(243)
Internal Medicine	(16)	(63)
Pulmonary Disease	(154)	(251)
General Surgery	(43)	(8)
Neurosurgery	(133)	(44)
Obstetrics-Gynecology	24	15
Ophthalmology	47	30
Orthopedic Surgery	(18)	(6)
Otolaryngology	(14)	10
Plastic Surgery	(170)	(163)
Thoracic Surgery	(197)	(168)
Urology	(5)	4
Neurology	(101)	(158)
Psychiatry	78	(85)
All Physicians	(13)	(19)

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

Specialization alone is not sufficient to ensure that surgeons always win; they must also control their area of specialization. Take thoracic surgeons, for example, who currently would lose almost $200 on every case. If they limited themselves to the major heart and lung operations for which they are uniquely trained, their net losses might be smaller or even become gains. Instead, thoracic surgeons perform a fair amount of other, often less complex surgery (e.g., pacemaker implants), for which there is a fair amount of competition, especially from general surgeons. Specialization with concentration is necessary to minimize the negative effects of low-cost competition.

Of course, mean gains and losses for a specialty do not mean that all physicians in that group win or lose. There are winners and losers within every specialty, as we see in Table 6-6. The first two columns for each state present the percent of physicians in each specialty who lose more than $50, and win more than $50 per case, respectively. (The percentages for all physicians are the same as those in Table 6-2; big and small losers, and big and small winners, have been combined.) In fact many specialties who incur net losses, such as neurosurgeons, orthopedic and plastic surgeons, have almost as many winners as losers. Take New Jersey neurosurgeons, for example, who on average would lose $133 on every Medicare admission (Table 6-5). Only 45 percent of neurosurgeons would lose more than $50 per case, and 41 percent would actually win $50 or more (Table 6-6).

6.4.3 Impact of a Global Medical DRG Payment

Earlier in Chapter 4 we saw that DRGs explained very little of the cost variation for medical admissions, and that gains and losses on any one case will be largely random. This suggests that a single global rate per medical admission might not be any less equitable on average. To test this, we substituted a single rate (the mean of all medical DRGs) for the DRG-specific rates in our calculation of gains and losses on medical DRGs, keeping reimbursement for surgical DRGs unchanged.

Table 6-6 shows the change in the distribution of winners and losers when a global rate is used for medical admissions. For physicians as a whole, there is very little change; there are a few more losers in New Jersey (40% versus 37% under a DRG-specific medical rate), but more winners in North Carolina (45% versus 42%). At the specialty level, however, there are major

TABLE 6-6

IMPACT OF A GLOBAL MEDICAL DRG PAYMENT ON DISTRIBUTION OF WINNERS AND LOSERS

	New Jersey				North Carolina			
	DRG-Specific Rate		Global Rate		DRG-Specific Rate		Global Rate	
	Losers	Winners	Losers	Winners	Losers	Winners	Losers	Winners
Family Practice	20%	59%	22%	56%	16%	58%	16%	60%
General Practice	25	55	28	51	8	63	8	64
Cardiology	44	33	59	27	67	11	64	20
Gastroenterology	63	19	82	11	72	5	85	8
Internal Medicine	35	39	42	33	40	29	46	24
Pulmonary Disease	41	16	89	5	57	33	90	5
General Surgery	43	42	39	47	32	42	26	49
Neurosurgery	45	41	33	57	45	33	17	54
Obstetrics - Gynecology	27	50	26	52	26	45	22	49
Ophthalmology	39	50	38	50	35	45	24	45
Orthopedic Surgery	43	42	27	60	28	39	15	65
Otolaryngology	40	47	30	58	33	46	21	62
Plastic Surgery	40	48	39	51	52	24	44	36
Thoracic Surgery	63	26	63	26	66	17	61	17
Urology	36	42	28	55	27	39	18	54
Neurology	52	31	65	18	70	11	71	8
Psychiatry	26	62	47	43	44	47	44	50
All Physicians	37	44	40	44	32	42	31	45

Losers = Includes physicians losing more than $50/case on average.
Winners = Includes physicians winning more than $50/case on average.
Global Rate = Winners and losers based on paying a single global rate for all medical DRGs combined with a DRG-specific rate for surgery.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

shifts in who wins and who loses. Most surgeons are more likely to win while medical specialists are much more likely to lose. The percent of losing gastroenterologists, for example, would increase from 63 percent to 82 percent, and from 72 to 85 percent, in New Jersey and North Carolina respectively. By contrast, the number of winners increases for all but one of the surgical specialties; in fact, in most instances, one-half or even more of the surgeons would be winners. The one exception is thoracic surgeons whose net loss position does not change, because they are not attending on any medical DRGs. All other surgeons, even neurosurgeons, not only admit a fair number of medical cases, but apparently treat them at a lower cost than the all-medical DRG average. We explore this in more detail later.

6.5 Decomposition of Gains and Losses

Given the small number of cases a physician treats within a given DRG (generally 2-3 on average), there is little opportunity for gains and losses to cancel each other out at the DRG level. Any cancelling out that occurs will have to take place across DRGs. To see how this happens, if at all, we need to decompose per case gains and losses for the practice as a whole and examine per case gains and losses by DRG.

Table 6-7 presents per case gains and losses for 25 specific DRGs for GPs, internists, and cardiologists. Some cancelling out does take place across DRGs, but it is fairly limited. GPs achieve net gains on virtually every DRG they admit, while internists and cardiologists lose money on almost every DRG they treat.* New Jersey internists, for example, do manage to "make money" on atherosclerosis (DRG 132) and angina (DRG 140), but these gains are more than offset by losses on every other DRG shown here. Internists and cardiologists lose on most DRGs that they admit probably for the same reason that they are losers overall: they are not price competitive with the GPs who treat very similar cases.

Ophthalmologists present an interesting contrast, since there is hardly any between specialty competition for their DRGs. For these physicians, gains and losses will be determined by how each ophthalmologist treats his/her cases

*Missing data in Table 6-7 does not mean that the specialty does not treat that specific DRG, only that the DRG was not among the 20 most frequent.

TABLE 6-7

DECOMPOSITION OF PER CASE GAINS (LOSSES) BY SPECIALTY

DRG		New Jersey			North Carolina		
		GPs	Internists	Cardiologists	GPs	Internists	Cardiologists
14	Specific Cerebrovascular Disorders	$71	$(45)	$(108)	$88	$(48)	$(149)
15	Transient Ischemic Attacks	76	(38)	(18)	92	(14)	(240)
82	Respiratory Neoplasms	--	(48)	--	--	(67)	--
87	Pulmonary Edema/Respiratory Failure	--	--	(91)	--	--	(13)
89	Pneumonia w/CC	98	(32)	(47)	42	(43)	(57)
96	Bronchitis w/CC	82	(19)	--	24	(20)	--
121	Complic. MI, alive	--	(17)	(133)	--	--	--
122	Uncomplic. MI, alive	25	(20)	(179)	88	(40)	(297)
124	Complic. Circulatory Dis w/Cardiac Cath	--	--	(138)	--	--	926
125	Uncomplic. Circulatory Dis w/Cardiac Cath	--	--	180	--	--	146
127	Heart Failure and Shock	29	(26)	(76)	49	(54)	(157)
132	Atherosclerosis w/CC	104	69	98	84	(38)	(331)
133	Atherosclerosis w/o CC	--	--	482	--	--	(504)
134	Hypertension	31	(15)	5	86	(34)	(376)
138	Cardiac Arrhythmias	31	(13)	(34)	96	(33)	(234)
140	Angina Pectoris	31	3	98	92	(30)	(479)
145	Other Circulatory Diagnoses	75	--	(32)	95	--	(215)
174	GI Hemmorhage	55	(15)	--	57	(47)	--
182	Gastroenteritis w/CC	59	(9)	--	45	(43)	--
183	Gastroenteritis w/o CC	53	(22)	--	49	(48)	--
243	Medical Back Problems	45	(33)	--	53	(51)	--
294	Diabetes	65	(23)	--	45	(56)	--
296	Misc. Metabolic Disorders	95	(14)	--	72	(70)	--
320	Kidney and Urinary Tract Infections	11	--	--	57	--	--
395	Red Blood Cell Disorders	(1)	(45)	--	37	(35)	--
Practice Average		$74	$(16)	$ (69)	$66	$(63)	$(230)

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

relative to other ophthalmologists. Table 6-8 decomposes per case gains and losses for ophthalmologists and compares those who lose on average with those who win or break even for their practice as a whole. The seven DRGs shown here account for 95 percent of ophthalmologists' inpatient caseloads. Winning ophthalmologists would make money on all DRGs, while losing ophthalmologists would win on only two of the seven. Practice-wide gains and losses are really driven, however, by how well ophthalmologists do with DRG 39 (lens procedures), since this single DRG accounts for 80 percent of their volume.

Ophthalmologists may lose money on lens procedure admissions, either because they charge higher fees or because they use more (or more expensive) inputs. Table 6-9 compares average per case costs between winners and losers for a number of different inputs to a lens procedure. Because these charges are averaged across all admissions, they reflect both the probability that the physician service was performed as well as the number of services actually provided (except for the use of an assistant surgeon which is expressed as a percent of cases only). Although losing ophthalmologists use more inputs than their winning colleagues, including more frequent use of assistants, this is not the main reason they would be in the red under DRG reimbursement. Higher surgeons' fees account for 69 percent and 78 percent of the difference in total MD-DRG costs between winners and losers in New Jersey and North Carolina, respectively.

Are losing ophthalmologists then simply unusually expensive physicians who could simply forego their high fees in order to break even? While that may be true in some cases, a more likely explanation is that winners and losers are performing <u>different</u> operations within the <u>same</u> DRG. Cataract extraction with an intraocular lens (IOL) implant at the same time is currently reimbursed at a rate about 50 percent higher in our states than extraction alone. Thus, losers may be losing simply because they are inserting IOLs along with their extractions, charging a lump sum for both. If this is the case, then losing ophthalmologists could only recoup their losses by splitting the admission in two: a first admission for cataract extraction and a second for IOL insertion. This of course would greatly increase total physician expenditures. We explore lens procedure readmissions in more detail in Chapter 8. There is little evidence that the extraction and IOL insertion procedures are currently being split into two admissions. Readmissions for this DRG are generally to repeat the surgery on the other eye.

TABLE 6-8

DECOMPOSITION OF PER CASE GAINS (LOSSES) FOR LOSING AND WINNING OPHTHALMOLOGISTS

DRG	New Jersey Losers (39%)	New Jersey Break-Even (11%)	New Jersey Winners (50%)	North Carolina Losers (35%)	North Carolina Break-Even (20%)	North Carolina Winners (45%)
36 Retinal Procedures	$ 143	$594	$647	$(114)	$320	$293
37 Orbital Procedures	(189)	97	216	(66)	11	68
38 Primary Iris Procedures	(90)	48	0	(272)	--	74
39 Lens Procedures	(279)	0	305	(194)	(13)	210
40 Extraocular Procedures, Except Orbit	(121)	(28)	136	18	30	141
42 Intraocular Procedures, Except Retina, Iris, and Lens	(119)	166	607	(229)	76	351
47 Other Eye Disorders	69	243	242	131	215	208
Practice Average	(270)	8	303	(185)	(3)	210

TABLE 6-9

SOURCES OF LOSS FOR OPHTHALMOLOGISTS: THE CASE OF LENS PROCEDURES (DRG 39)

	New Jersey Losers	New Jersey Winners	North Carolina Losers	North Carolina Winners
Surgeon's fee	$1,512	$1,109	$1,233	$915
Routine Visits	60	38	12	6
Consultations	41	30	9	4
Other Surgery	24	7	31	10
X-Rays	14	12	14	10
Other Tests	24	13	9	6
Percent of Time Assist. Surgeon Used	87%	59%	10%	2%
Total MD-DRG Cost	$2,122	$1,538	$1,489	$1,082
Mean Gain (Loss)	$(279)	$ 303	$(185)	$ 210

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

6.6 Impact of Inter-Specialty Competition on Winners and Losers

Earlier in Section 6.4.3, we saw that a global payment rate for all medical DRGs would generate more gains for surgeons, suggesting that they admit a fair number of medical cases and that they are cost competitive with other specialties. To look at the degree of inter-specialty competition more closely, we chose a medical DRG that is commonly treated by both medical and surgical specialists: medical back problems (DRG 243). Four specialties admit 80-90 percent of cases: GPs, internists, neurosurgeons, and orthopedic surgeons. GPs and orthopedic surgeons make money on these cases, while internists and neurosurgeons lose money.

Table 6-10 compares the physician services used by these four specialties to treat medical back problem cases, how long they keep them in the hospital, and what kinds of patients they are. While GPs have longer stays in the hospital, this is more than offset by their lower per diem visit fees and generally low utilization rates for other services. Internists run a loss on medical back problem cases because they charge higher visit fees, they keep their patients in longer than other specialties, and they run more tests and x-rays compared with orthopedic surgeons. Neurosurgeons, on the other hand, lose primarily because of their intensive diagnostic work-ups (i.e. more surgery and x-rays), despite very short hospital stays.

Are orthopedic surgeons simply more efficient in managing medical back problem cases? MD-DRG costs 20-25 percent lower than those of internists certainly is suggestive. An alternative explanation is that orthopedic surgeons are treating a healthier group of patients, perhaps in preparation for surgery during a subsequent admission. Their patients are definitely younger and more likely to be male compared with those treated by GPs and internists. This can only be a partial explanation, however, since neurosurgeons (whose costs run 25-30% above those of their orthopedic colleagues) admit even younger, male patients. Most likely, the answer lies in casemix differences not captured by this DRG.

TABLE 6-10

SPECIALTY DIFFERENCES IN TREATMENT OF MEDICAL BACK PROBLEMS (DRG 243)

	New Jersey				North Carolina			
	GPs	Internists	Neuro-Surgeons	Orthopedic Surgeons	GPs	Internists	Neuro-Surgeons	Orthopedic Surgeons
Routine Visits - Attending MD	$242	$292	$215	$230	$160	$206	$142	$161
Routine Visits - Other MDs	37	47	45	51	8	21	11	18
Consults	67	66	85	63	11	29	33	24
Diagnostic Surgery	22	32	111	26	6	31	75	24
X-Rays	99	107	134	89	62	95	129	81
Other Tests	75	79	62	60	7	18	25	11
Total MD-DRG Cost	545	623	652	520	254	401	414	319
Gain (Loss)	$ 45	$(33)	$(61)	$ 66	$ 53	$(51)	$(33)	$ 34
Length of Stay (days)	13.9	13.0	9.6	12.1	10.4	10.1	7.5	9.6
Patient Characteristics:								
% 75 years +	43	43	19	35	48	48	28	33
% Male	28	29	46	35	25	27	46	35

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

7.0 DISTRIBUTIONAL EFFECTS OF PHYSICIAN DRGs ON MEDICAL STAFFS AND HOSPITALS

7.1 Introduction

Previous chapters have amply demonstrated the large variation in physician costs both across cases and across physicians. A clear implication of this variation is that a fixed per case payment would put providers at considerable risk, even if it were DRG-specific. Three underlying factors are presumably responsible for the variation: (1) random variation in illness severity; (2) socio-economic differences that affect patient demand and physician fees; and (3) differences in practice "styles". The first can be considered in two parts: (a) variation in illness mix across DRGs; and (b) variation in illness severity within DRG. The DRG system as presently constituted addresses (a) through DRG-specific payment but not (b) which remains an unknown. Differences in costs can also occur for patients with identical illnesses if they differ in ability to pay or attitudes towards medical care. For Medicare patients specifically, ability to pay variation is relatively minor due to supplementary insurance, leaving attitudes and physician fee competition the likely sources of variation in the second category. Finally, differences in physician inputs, or costs, can occur for identical patients seeing different physicians if the latter differ in the treatment style, or regimen, employed. With perfect competition and consumer information, such styles would disappear (unless patients had preferences for one style over another, e.g., surgery over drugs). Neither condition obtains in medical care, of course, permitting variation in regimens that may be systematically related to economic motives of providers; that is, doing more for the patient may mean more income. Peer associations also plays a role in determining styles through communication of new techniques among physicians practicing together and discouragement of "deviant" regimens through peer review.

Physician DRGs, like hospital DRGs, are to be targeted towards the reduction, if not complete elimination, of cost variation due to individual patient demands and physician styles. If a physician is treating two patients of differing severity, reimbursement differentials are completely justified. On the other hand, if the patients differ in, say, their preferences for more

services, this is a different matter. The same is true for physicians using more intensive regimens on identical patients. Hence, the critical question for public policy is the degree to which MD-DRGs control for legitimate variation in severity alone.

Examination of patient attitudes or physician fee-setting in any systematic manner is really beyond the scope of our study, but we can say something regarding provider styles, as we did in the previous chapters when we decomposed costs by the specialty of the attending physician. There is still another way of approaching the question, however, one that focuses on the hospital's medical staff as the unit of analysis. If inpatient peer review determined treatment patterns to a large extent, and DRGs controlled adequately for severity, then most of the within-DRG differences would be among staffs of different hospitals. That is, all physicians in "Memorial" hospital would treat diabetics in the same manner, a manner that would differ from that observed across town in "St. Mary's".

The degree of medical staff homogeneity also speaks to the question of "who to pay?" We have already discussed the major payment alternatives in Chapter 2, Viz., paying the attending a MD-DRG flat rate, or the medical staff, or the hospital. A potential advantage of paying the medical staff would be the opportunity for physicians to pool the systematic and random risks at the physician level. How successful pooling would be depends on the homogeneity of practice styles. If all physicians at Memorial treat diabetics very intensively relative to those at St. Mary's, they will not be able to offset losses with gains. Conversely, if no staff-wide style exists and high and low-cost physicians are randomly distributed across hospitals, each hospital's medical staff can devise a system for sheltering physicians against uncontrollable risk.

Risk-pooling can be extended further by pooling both the Medicare institutional (Part A) and physician (Part B) payment and paying a combined rate. If physician and hospital costs within DRG are substitutes, then pooling can generate savings on one side that can be used to offset losses on the other. If they are complementary, then risk-pooling between the two types of services in unachievable, and major changes in both hospital and

physician styles must occur. Either that, or higher overall costs may be indicative of systematic variation in illness severity that has not been controlled by the DRG system.

Research Questions

To shed some light on the broad issues of practice styles, the potential of risk-pooling, and the appropriate locus of payment, this chapter addresses the following research questions:

(1) How homogeneous are physicians across hospitals? How homogeneous are hospitals in terms of size and casemix?

(2) Would most physicians on a particular medical staff win or lose under physician DRGs? If so, are winners or losers associated with particular hospital characteristics like urban-rural location and teaching status?

(3) How much of the gain or loss at the medical staff level is due to DRG mix? To hospital and staff characteristics holding DRG casemix constant?

(4) Is the degree of homogeneity of styles within institution related to the concentration of patients among a few physicians?

(5) Concerning a combined hospital-physician payment, are the two costs complementary or substitutes?

(6) Is the variation in gains (losses) for a combined payment greater than (less than) that for MD-DRGs alone? If greater, is it positively related to the scope of casemix due to diseconomies of breadth?

(7) How might the PPS add-on for teaching affect the pattern of gains under combined payment?

7.2 Methods

The analyses of the effects on medical staffs and joint hospital medical staffs of a single payment for an inpatient stay involved the creation of a data file with the hospital as the unit of analysis. The thousands of

individual patient claims analyzed in Chapters 4 and 5 were aggregated to the hospital level in both states.

The hospitals to be analyzed were initially required to meet two criteria:

- Hospitals were required to have data describing the facility in terms of type of hospital, bedsize, ownership and also cost data necessary to transform charges into cost.
- Hospitals with a minimum of 25 Medicare admissions during the year were retained.

Applying the above criteria had the following results:

	New Jersey	North Carolina
Total Number of Hospitals	119	154
Hospitals with $<$ 25 admissions	(6)	(15)
Hospitals included	113	139

Nineteen of the remaining hospitals in New Jersey and sixteen in North Carolina were missing Medicare Cost Reports from which we obtained the facility characteristics as well as cost data. Where possible, we identified these hospitals and coded the appropriate descriptors from the Guide to the Health Care Field published by the American Hospital Association (AHA). The AHA data, however, do not include cost information. In order to transform charges into costs in these hospitals (typically psychiatric facilities), we applied an average per diem and average departmental cost-to-charge ratio by urban/rural and ownership. The detailed description of how the charge data were transformed into costs can be found in Chapter 3.

7.2.1 Construction of Analytic Variables

Variables describing the hospital and its medical staff include:

- Location
- Ownership
- Type of hospital (e.g. short-term general)
- Bedsize
- Medicare dependency
- Teaching status
- Specialty mix.

We also constructed several additional analytic variables to capture the unique qualities of each hospital:

- A casemix index
- A DRG concentration index
- A medical staff concentration index

<u>Case Mix Index</u>

The <u>Case Mix Index</u> for physician services (CMI-B) is a ratio which compares each hospital's expected cost of physician service for the types of Medicare cases that are treated there.

$$\text{CMI-B}_h = \sum_i \left[\frac{C_i}{\sum C_i} * \frac{DRG_{ih}}{ADM_h} \right]$$

where C_i = average cost for i-th DRG.

DRG_{ih} = number of cases in i-th DRG for the h-th hospital.

ADM_h = total admissions in the h-th hospitals.

The numerator of a hospital's CMI-B index is simply the proportion of the hospital's cases falling into a particular DRG multiplied by a cost weight for that DRG, summed over all DRGs. This numerator, the expected cost of the hospital's average case is divided by the average case cost for all hospitals. A similar calculation is done using joint Part A and Part B data (CMI A-B).

<u>DRG Concentration Index</u>

The DRG Index (DRGIND) is an attempt to capture the extent of product differentiation at the hospital level. That is, if one defines patients within a DRG as a unique product, this Herfindal index reflects how the output of the medical staff in each hospital is diffused across DRGs.

$$DRGIND_h = \sum_i \left[\frac{DRG_{ih}}{ADM_h} \right]^2$$

As the index approaches one, the patient mix becomes more concentrated in fewer DRGs. If it is near zero, this reflects cases that are widespread across DRGs.

Physician Concentration Index

To evaluate the contribution of individual practice styles, we included a physician concentration index (CONCIND) constructed in a similar way to the DRG index discussed above.

$$CONCIND_h = \sum_k \left[\frac{ADM_{kh}}{ADM_h} \right]^2$$

where ADM_{kh} = number of admissions for which the k-th physician is the attending physician; and

ADM_h = total admissions in hospital h.

Hospitals whose admissions are treated by few attending physicians will have a high value for this index compared to a hospital where a large number of physicians are each admitting a few patients.

7.2.2 Identification of Winning and Losing Medical Staffs and "Joint Ventures"

In order to evaluate the effects of a per case reimbursement system at the hospital level, we calculated two case-based payments for the medical staff. One is a statewide average payment for each DRG based on all cases treated in all hospitals (TOTB). The second method is based on two averages, one calculated for cases treated in urban hospitals (SMSAs) and one for those treated in rural (non-SMSA) hospitals [TOTB(U/R)]. Medical staff payment per DRG is simulated by multiplying the average payment per case by the number of admissions in that DRG.

To determine whether a medical staff gains or loses for each DRG, the costs of treating all patients in a DRG are summed at the hospital level and then subtracted from the simulated medical staff payment. This process is repeated for each DRG and summed over all DRGs treated in each facility. A similar set of payment rates based on both hospital and physician costs were calculated for so-called "joint ventures" of hospitals and their medical staffs.

7.3 Industry Structure in New Jersey and North Carolina

7.3.1 Contributors to Interhospital Differences in Practice Styles

The size and composition of hospitals and physician staffs are important for our analysis in three important. First, there is the contribution of physician specialty to the average cost per admission to a hospital. Specialists have been shown to have a more resource intensive mode of practice due to their patients' severity of illness or to differences in their training and expertise. Specialized medical staffs may also more frequently involve consultants for advice on treating problems outside their specialty.

The second issue has to do with the concentration of the medical staff and to what extent individual physicians might dominate the style of medical practice at a hospital. If the majority of admissions are assigned to a few attending physicians, one might expect greater homogeneity of practice styles within hospitals. Fewer physicians might facilitate communication and make it easier to identify modal behavior patterns within the hospital. Conversely, the less concentrated the medical staff, the less concern each individual physician will have over higher costs per admission (See Pauly, 1980).

A third important relationship has to do with the heterogeneity of hospitals themselves. In general, the more homogeneous the hospital industry is, the less patient triaging is likely to take place, producing less variation in casemix, illness severity and presumably in costs as well. For example, if all hospitals in a state were large tertiary institutions treating a broad number of cases, they should all exhibit about the same CMI and average costs per admission.

7.3.2 Hospital and Medical Staff Characteristics

The characteristics of hospitals and their medical staffs are summarized below in Tables 7-1 and 7-2. The hospitals shown here represent all those with more than 25 Medicare admissions.

TABLE 7-1

CHARACTERISTICS OF HOSPITALS IN NEW JERSEY AND NORTH CAROLINA

Hospital Type	New Jersey (n = 113)	North Carolina (n = 139)
Short term general	83.2%	92.8%
Short term specialty	3.5	1.4
Rehabilitation	3.5	1.4
Psychiatric	6.2	4.3
Control		
Private Non-Profit	85.8	44.6
For-Profit	2.7	10.8
Government	8.0	43.9
Unknown	3.5	0.7
Bedsize		
50	1.8	10.1
51-199	27.4	61.2
200-399	42.5	13.7
400	23.9	13.7
Unknown	4.4	1.4
Teaching Status		
Teaching	57.5	11.5
Non-Teaching	42.5	88.5

Sources: Medicare Cost Reports for New Jersey and North Carolina 1981, Guide to the Health Care Field, American Hospital Association 1982, Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

TABLE 7-2

SPECIALTY MIX AND CONCENTRATION OF MEDICAL STAFFS BY HOSPITAL CHARACTERISTICS

	New Jersey	North Carolina	New Jersey		New Jersey		North Carolina		North Carolina	
	All	All	Urban	Rural	Teaching	Non-teaching	Urban	Rural	Teaching	Non-teaching
GP/FP	12.5%	38.8%	13.0%	11.0%	10.8%	14.2%	25.1%	47.8%	21.3%	41.1%
Internist	38.2	27.4	37.5	40.3	37.3	38.4	27.9	27.1	33.9	26.6
Other Medical Specialist	11.1	2.7	11.5	10.3	13.0	10.1	3.6	2.1	6.3	2.2
General Surgeon	11.8	13.4	12.0	14.7	11.6	12.9	12.7	13.8	15.9	13.0
Other Surgical Specialist	15.3	8.8	15.5	16.8	16.9	14.8	11.5	6.9	15.8	7.9
Other Specialist	11.1	9.0	10.4	6.8	10.5	9.5	1.9	2.3	6.8	9.1
MD Concentration Index	.080	.172	.062	.085	.048	.077	.135	.151	.071	.153

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

Hospital Characteristics

The distribution of hospitals in New Jersey shows that the majority of hospitals are short-term general, non-profit (85.8%) facilities, often with teaching affiliations (57.5%). Two-thirds have more than 200 beds and nearly a quarter have more than 400 beds.

In North Carolina, like New Jersey, nearly all are short-term general hospitals (92.8%), but almost half (nearly 44%) are operated by a government agency (usually county) vs. only 8 percent in New Jersey. More than ten percent are proprietary and only 11 percent have any teaching affiliations. Most North Carolina hospitals are small, with 71 percent having fewer than 200 beds and 10 percent fewer than 50 beds.

Medical Staff Characteristics

The composition of the medical staffs (Table 7-2) in New Jersey shows surprisingly few differences between urban/rural or teaching/nonteaching hospitals. Admissions by internists amount for slightly more admissions (40.3%) in rural hospitals than in urban hospitals (37.5%) while other medical specialists admit more frequently in urban hospitals. General surgeons and other surgical specialist admit somewhat more frequently (31.5%) in rural than in urban hospitals (27.5%). GPs/FPs account for somewhat more admissions in non-teaching hospitals, (14.2 % vs. 10.8%) but the differences are not nearly as marked as we might have expected.

There are remarkable differences in the composition of medical staffs across North Carolina hospitals, on the other hand. Overall specialization is much less than in New Jersey with sharp locational and teaching distinctions. Nearly half of the patients in rural hospitals are admitted by GPs/FPs as compared with 25 percent in urban hospitals. Admissions by either medical or surgical specialists are relatively infrequent in rural and non-teaching hospitals.

Finally, comparisons of the MD concentration ratio between the two states show a much less concentrated style in New Jersey. This is true across the board, regardless of hospital type. Teaching hospitals clearly have more attendings per admission which contributes to New Jersey's decentralized care process, relative to North Carolina.

7.4 Characteristics of Winning and Losing Medical Staffs

7.4.1 Overview of Issues

In this section, we simulate who the winners and losers would be, if the DRG payment were made to the medical staff. The medical staff is defined as all attending physicians at a given hospital. We test two methods of payment, one based upon a state-wide DRG average, and the second based upon urban and rural DRG means. In particular, we seek to answer the following questions:

(1) What are the redistributional effects of gains/losses across medical staffs, as measured by dollars per admission, per physician, and as a percent of Medicare Part B payments?

(2) Do these effects vary by urban location, teaching status, or ownership?

(3) Are the effects sensitive to the choice of a statewide or urban/rural differential average?

(4) How do the winners or losers vary in their patterns of resource utilization?

(5) How do winners or losers differ in their specialty mix or physician concentration?

7.4.2 Level and Variation in Gains (Losses) in MDDRGs for Medical Staffs

Table 7-3 compares gains and losses for the medical staffs in our states, first based upon a statewide DRG average and then based upon urban-rural DRG averages. Using a single statewide rate per DRG, the average medical staff would realize total gains of $5,823 and $170 in New Jersey and North Carolina, respectively. These gains are achieved primarily by staff in rural and non-teaching hospitals. The magnitude of the redistributive impacts is far larger than what is implied by the average across all medical staffs. Medical staff based in rural hospitals in North Carolina would achieve total average gains of $98,868, largely at the expense of their colleagues in urban hospitals who would incur total average losses of $152,839.

Paying based on urban-rural averages definitely restores some equity across medical staffs. Those based in urban and teaching hospitals still run losses on average, but the absolute dollars are considerably smaller. The

TABLE 7-3

COMPARISON OF WINNING AND LOSING MEDICAL STAFFS USING STATE-WIDE AND URBAN-RURAL MEANS

Reimbursement Basis for Physicians	Total		New Jersey		New Jersey		North Carolina		North Carolina	
	NJ (N=113)	NC (N=139)	Urban (87%)	Rural (13%)	Teaching (43%)	Non-Teaching (57%)	Urban (39%)	Rural (60%)	Teaching (11%)	Non-Teaching (88%)
Using Statewide Average										
Gain (loss) Total	$5,823	$170	$(19,929)	$176,336	$(33,646)	$35,492	$(152,839)	$99,868	$(510,883)	$66,642
Gain (loss) Per Admission	20	65	8	101	11	27	9	103	(66)	83
75th quantile	107	134	92	164	83	132	104	142	94	134
50th quantile	11	86	(18)	132	(21)	32	39	104	(48)	91
25th quantile	(81)	35	(82)	60	(93)	(80)	(69)	68	236	46
Gain (loss) Per physician	316	1272	343	137	(152)	437	1643	1041	(676)	1526
75th quantile	1314	3213	1464	802	1328	1381	4065	2175	3109	3213
50th quantile	(76)	1435	(87)	(76)	(297)	44	2353	1159	(1169)	1613
25th quantile	(1014)	(87)	(1090)	(558)	(1136)	(970)	(123)	(95)	(4080)	96
Gain (loss) as a % of Part-B	2	8	1	13	0	4	(5)	22	(14)	15
Using Urban - Rural Averages										
Gain (loss) Total	$(1,452)	$(1,763)	$(1,216)	$(3,470)	$(17,752)	$10,475	$(7865)	$935	$(332,778)	$41,295
Gain (loss) Per Admission	6	46	12	(38)	15	(1)	70	31	(17)	54
75th quantile	82	108	101	49	62	87	170	72	162	103
50th quantile	(13)	45	(13)	(12)	(14)	9	102	31	(31)	49
25th quantile	(76)	(3)	(72)	(115)	(83)	(76)	(7)	(3)	(173)	3
Gain (loss) per Physician	449	2347	213	1994	83	719	152	3797	(1635)	2865
75th quantile	1613	4148	1295	4294	1303	2377	2372	5403	1719	4401
50th quantile	77	2581	(46)	450	(389)	143	840	3629	(1095)	2833
25th quantile	(1203)	940	(1276)	110	(1333)	(839)	(1129)	2230	(4869)	1445
Gain (loss) as a % of Part-B	1	4	1	0	1	2	4	5	(8)	9

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

total loss for medical staffs in urban North Carolina hospitals, for example, is only one-twentieth of what it was under a statewide average ($7,865 compared with $152,839). Except for North Carolina teaching hospitals, all losses are relatively trivial in toto, representing only a few percent of total physician DRG costs. Because the urban-rural differential seems more equitable for policy purposes, we focus the remaining discussion on the bottom half of Table 7-3. All subsequent sections in this chapter also report effects of urban-rural, rather than statewide, averaging.

Total gains and losses can be somewhat misleading, because they fail to adjust for volume. Large losses in toto could be simply due to small losses incurred on a very large number of admissions. In order to hold Medicare caseloads constant, we simply express net gains (losses) on a per admission basis. In addition, we put gains and losses on a per attending physician level. Again, large overall gains (losses) may be partly a function of medical staff size. The larger the medical staff, the smaller any gains or losses will be, thereby diluting any cost-saving incentives.

In Table 7-3, we observe the incongruous finding that while medical staffs may run a total loss on average; the staff may actually win on a per admission or a per physician basis. Take urban medical staffs in North Carolina, for example. Total losses average $7,865, but these staffs achieve per admission gains of $70 and per physician gains of $152. This apparent anomaly is a result of several statistical artifacts. First, total gains and losses in these cases are quite small relative to total physician costs and probably not statistically significant. Second, if losses, caseloads, and medical staff size are positively correlated, this will have the effect of reducing the per admission/per physician loss for big losers and increasing the per admission/per physician gain for winning medical staffs. An average of this ratio across medical staffs will then have a positive skew. Third, the sample sizes are quite small and sensitive to extreme values (either negative or positive).

Once we adjust for volume, most medical staffs in both states manage to make money, ranging from $12 to $70 per admission. Staffs of rural New Jersey hospitals and North Carolina teaching hospitals run a loss on every admission, however, apparently treating their cases more intensively compared with their

counterparts. Casemix cannot explain these losses, as all payments are DRG-specific. Alternative explanations include staff specialty mix and hospital characteristics; we explore these later.

How would these gains or losses be distributed across the medical staff? The individual attending's share in the gain would be $449 on average in New Jersey and $2,347 in North Carolina. These shares are not equally distributed across medical staffs, however. Medical staffs at North Carolina nonteaching hospitals and at rural hospitals in both states would receive windfall gains of $2,000-$4,000 annually, definitely a large enough "bonus" to encourage cost-conscious treatment regimens (assuming, of course, that staff savings are pro rated to individual attendings). Staff in North Carolina teaching hospitals, on the other hand, would receive $1,635 less per physician than what they had spent in treating patients. This represents about 1.5 percent of what the average physician in the South earned in 1982 (AMA, 1984), and should be sufficiently large to spark some practice changes.

How do these patterns vary by ownership of the hospital? Table 7-4 compares the winning and losing medical staffs. Three trends are identified.

<u>For-Profit Hospitals</u>: In both states, staff based in for-profit hospitals show an overall gain from DRG-payment: for-profits gain $55,074 in New Jersey and $49,732 in North Carolina. Each staff physician on the medical staff would average $507 in additional revenue in New Jersey and $629 in North Carolina.

<u>Government-owned Hospitals</u>: The effects on the staff in government-owned hospitals are very different in the two states. In New Jersey, medical staffs lose on average $75 per admission and $299 per physician. In North Carolina, on the other hand, medical staffs make money, $50 per admission and $2,464 per physician.

<u>Non-Profit Hospitals</u>: The medical staffs in non-profit hospitals fare differently depending on whether or not the hospital is church affiliated. The medical staffs of New Jersey hospitals owned by religious organizations lose $12 per admission on average and $147 per physician. Similarly, each member of the medical staff in church affiliated North Carolina hospitals would lose $890 on average. By contrast, medical staff in other (non-church) non-profit hospitals would actually make money.

TABLE 7-4

COMPARISON OF WINNING AND LOSING MEDICAL STAFFS BY HOSPITAL OWNERSHIP IN TWO STATES USING URBAN-RURAL MEANS

	New Jersey			
	Church Non-Profit (17)[a]	Other Non-Profit (80)	For-Profit (3)	Government (9)
<u>Using Urban-Rural Average</u>				
Gain (Loss) Total	($45,283)	$19,827	$55,074	($34,103)
Gain (Loss) Per Admission	(12)	19	(32)	(75)
75th quantile	84	84	127	(12)
50th quantile	(1)	(1)	(107)	(87)
25th quantile	(82)	(67)	(115)	(129)
Gain (Loss) Per Physician	(147)	672	507	(299)
75th quantile	1163	2823	2628	154
50th quantile	(7)	122	110	(29)
25th quantile	(1800)	(1218)	(1218)	(948)
Gain (Loss) as % of Part B	0	2	6	5

	North Carolina			
	Church Non-Profit (6)	Other Non-Profit (56)	For-Profit (15)	Government (61)
<u>Using Urban-Rural Average</u>				
Gain (Loss) Total	($379,940)	$10,047	$49,732	$16,117
Gain (Loss) Per Admission	(12)	43	49	50
75th quantile	(87)	2	141	105
50th quantile	(129)	(55)	86	45
25th quantile	(55)	(11)	11	5
Gain (Loss) Per Physician	(890)	3027	629	2464
75th quantile	1316	4245	3632	4322
50th quantile	(923)	3121	2006	2581
25th quantile	(2658)	1598	321	1111
Gain (Loss) as % of Part B	3	5	13	4

[a]Number of staffs in parentheses.

<u>Source</u>: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

7.4.3 Specialty Mix and Concentration of Winning and Losing Medical Staffs

What are the characteristics of the winning and losing medical staffs? Table 7-5 suggests that specialty mix may be a key factor in determining big winners and losers. Winning medical staffs in both states are those where GPs/FPs account for a substantial number of admissions, 14.5 percent in New Jersey and 46.7 percent in North Carolina. Internists in New Jersey account for 50 percent of admissions in winning medical staffs. From the physician level analysis, we know that internists in New Jersey function much like GPs. If we add admissions by internists to the GP/FPs in New Jersey, the winners are those medical staffs dominated by non-specialists. The medical staffs dominated by specialists, particularly medical specialists, are losers. In New Jersey, other medical specialists account for 14 percent of admissions in losing medical staffs and only 5.5 percent of admissions in winning staffs.

Table 7-5 also compares the average cost for categories of ancillary services between winners and losers. Winning medical staffs consistently use fewer ancillaries than the losers in both states. The average cost for consultant services is $85 among losing medical staffs in New Jersey and $32 among the winners. The difference in average cost for other tests is even more striking, $293 and $101 for losers and winners, respectively. In North Carolina, the winning staffs spend only $8 on average for other tests per admission while the losers spend $35.

As expected, the winners in both states are located in smaller hospitals. This is partly a teaching effect, since larger hospitals tend to be teaching facilities.

Comparison of winners and losers by their DRG concentration indices suggest that winning medical staffs have concentrated their admissions in a few DRGs. The average index for New Jersey winners is .236 versus .106 for losers. In North Carolina the average for winners is .160 and .005 for losers. It also appears that winning medical staffs in North Carolina are composed of fewer attendings relative to total admissions, with an average MD Concentration Index score of .248 compared with .094 for losing staffs. A similar distinction is not apparent in New Jersey.

TABLE 7-5

ADMISSIONS BY SPECIALTY AND AVERAGE ANCILLARY USE OF WINNING AND LOSING MEDICAL STAFFS USING URBAN-RURAL AVERAGE COST PER CASE

	Big Losers[a]		Big Winners[b]	
	New Jersey (7.1%)[c]	North Carolina (9.4%)	New Jersey (3.5%)	North Carolina (14.4%)
Admissions by Specialty				
GPs/FPs	4.5%	10.4%	14.5%	46.7%
Internists	36.8	39.0	50.0	12.1
Other Medical Specialists	13.9	7.7	11.7	.9
General Surgeons	9.9	12.0	4.6	12.1
Other Surgical Specialists	16.8	16.4	8.3	5.6
Multi-Specialty Groups	2.4	0.1	7.5	0.0
All Others	15.7	14.4	3.5	22.5
Average Costs Per Admission				
Consultant	$ 85	$29	$ 32	$ 7
Radiology	84	88	63	35
Other Tests	293	35	101	8
Other Surgery	155	117	78	23
Hospital Characteristics				
Average Bed Size	361	463	162	169
DRG Concentration Index	.106	.055	.236	.160
MD Concentration Index	.153	.094	.165	.248

[a]Big Losers are those medical staffs with a loss per case more than 1 standard deviation from the geometric mean.

[b]Big winners are those medical staffs with gains per case more than 1 standard deviation from the geometric mean.

[c]Relative frequencies of each category is shown in parentheses.

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

7.5 Multivariate Analysis of the Variation in Medical Staff Costliness

7.5.1 Research Questions

The preceding descriptive section has shown large variations in the average costliness of physician services among institutions. Using multivariate regression techniques, we pursue the topic further in answering the following questions:

(1) Within selected medical and surgical DRGs, how much of the statistical variation in costliness per case can be explained by unique differences across medical staffs as a whole?

(2) Pooling across all the cases in a hospital, how much of the variation in average costliness per case at the medical staff level can be explained by differences in our physician DRG casemix index, location, teaching status, and degree of physician concentration?

(3) How does the answer to question (2) change when costliness is put on a gain-per-admission basis?

(4) Finally, how sensitive are the results to the state chosen for analysis?

With the first question, we would like to determine whether systematic differences in practice regimens exist across hospital medical staffs, and, if so, how much of the total variation in per case costliness across all hospitals can be identified as a between-hospital "staff" effect. By doing the analysis for a given DRG, or a small set of closely related DRGs, we hold constant as best as possible the inter-staff differences in casemix complexity and severity.

With the second question, we essentially suppress all of the within-hospital variation in regimens and casemix in constructing a staffwide average cost per case. We then test whether this global average is systematically different across hospitals, holding the casemix of each hospital constant. The results should differ from the previous ones on an individual case basis because we have far less variation to explain. Urban-rural location, teaching status, and degree of physician concentration represent a set of hospital or physician characteristics that should explain at least a part of the systematic differences across medical staffs.

By transforming average costliness into an average gain, we effectively purge the staff-specific average cost of casemix effects, permitting a more direct comparison of performance across staffs. It is also the more relevant policy variable, assuming of course that hospitals would be paid according to an average cost scheme based on statewide or urban-rural rates. Because urban-rural rates seem more politically feasible, we use them in all of the analysis of gains that follows.

Finally, differences in medical staffs clearly exist across states as well as across hospitals in the same state. Thus, it is important to have some idea how sensitive the results are to interstate differences in medical staffs--as well as the hospital industry more generally. If, for example, every hospital's medical staff looked exactly alike in one state in terms of specialty mix but was quite different in another state, analysis of the former would seriously understate the effect of interstaff differences elsewhere if such effects on costliness do exist.

7.5.2 DRG-specific Effects of Medical Staffs on Costliness

To answer the question of within-DRG staff effects on physician costliness per case, two sets of DRGs were chosen, one for cerebrovascular disorders, another for cholecystectomies. Actual physician costs per discharge were regressed on a set of dummy variables for each hospital in the state. Additional dummies were included to control for DRG mix in each illness set.* If no within-staff differences existed in the practice regimens of attendings, the R^2 from the regression would be equal to 1 and the dummy coefficients, reflecting average costliness per institution, would explain all the observed variation. If, at the other extreme, no staff-specific mode of practice existed anywhere in treating a given DRG, the R^2 should be zero and all the hospital coefficients should equal the state average costliness per case.

Table 7-6 gives the R^2, confidence level (p), coefficient range, and number of cases for each regression. For the cerebrovascular admissions, medical staff dummies explain 6.6 percent and 11.6 percent of the variation in

TABLE 7-6

CONTRIBUTION OF MEDICAL STAFFS TO VARIATION IN COSTLINESS PER CASE FOR CEREBROVASCULAR DISEASE AND CHOLECYSTECTOMIES BY STATE

	New Jersey		North Carolina	
	Cerebrovascular Disease	Cholecystectomies	Cerebrovascular Disease	Cholecystectomies
R^2 (P)	.066 (.0001)	.200 (.0001)	.116 (.0001)	.205 (.0001)
Coefficient Range	$886	$1,786	$761	$1,241
Number of Cases	9,563	2,786	8,237	2,555

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

New Jersey and North Carolina, respectively.* Both R^2s are statistically highly significant indicating that staffwide effects apparently do exist in the treatment of this disease. This is further indicated by the range of coefficients. In North Carolina, for instance, there was a $761 difference in average staff costliness per cerebrovascular case around a statewide mean of $411. Part of this difference no doubt is attributable to legitimate urban-rural cost-of-living differences in physician fees; thus, the R^2s should be considered overstatements of the true staff effects on practice regimens.**

Cross-staff differences appear somewhat more pronounced for cholecystectomies, as evidenced by the higher R^2s. However, because four DRGs have been combined that have fairly disparate costs, DRG mix effects are much greater than for cerebrovascular diseases, and the staff-specific effects are probably not that much different than in New Jersey.

While it is difficult to generalize from just one medical and one surgical set of related DRGs, it is probably fair to say that medical staffs in different hospitals do show systematic differences in average costliness and, by extension, in treatment regimens as well. Whether this is all due to within-DRG differences in severity or to arbitrary differences in medical training and/or peer associations is unknown. For cholecystectomies, in particular, it is hard to ascribe all of the interstaff differences to severity. Do smaller, less sophisticated hospitals really triage the "tough" gallbladder operations to tertiary hospitals? This seems unlikely.

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*While one could also argue for including an urban-rural dummy to capture cost-of-living effects on fees, we did not on the grounds that sharp locational differences in practice styles exist that would also have been captured in such a dummy variable.

**Pooling several related DRGs and then using DRG-specific dummies also contributes marginally to the R^2, and the numbers cited in the text slightly overstate staff effects. For cerebrovascular disease in New Jersey, the $R^2 = .052$ without the DRG dummies.

7.5.3 Across-DRG Effects of Medical Staffs on Costliness and Gains

Next, we consider the effects of medical staffs on average costliness and gains when all the staff's cases are pooled to the hospital level. A dummy variable for each staff is no longer possible, but we can characterize staffs by their specialty mix, degree of admissions concentration by physician, and by hospital bedsize, ownership, teaching status, and DRG concentration. Regressing average costliness per admission per medical staff on these variables gives a measure of the systematic variation in costs explained by these characteristics (as indicated by the R^2). The coefficients can be interpreted as mean differences across staffs relative to the left-out group represented by the intercept.

Transforming costliness to average gain-per-admission per institution using the urban-rural adjusted DRG payment provides a different interpretation of the regression. Now, the R^2 measures the average deviation of staffs, controlling for location and DRG mix through the payment mechanism, that is explained by the included variables. The coefficients can now be interpreted as measuring the systematic incidence of gains or losses, e.g., will staffs of teaching hospitals systematically lose under such a payment scheme?

Costliness Results

Tables 7-7 and 7-8 give two sets of results for New Jersey and North Carolina. The first three columns of each table have average total Part B physician costs per case per hospital as the dependent variable (TOTB) while the second three explain (urban-rural adjusted) gains per admission (BGAIN(U/R)). Variables have been stepped in in three sets: first, just the physician casemix index alone (CMI-B); then all physician and hospital characteristics; and finally, the specialty mix of attendings (PCTSP2-7) is substituted for the physician Herfindal Concentration Index (CONCIND). CMI-B is excluded from the gains equation, having already been controlled for in the dependent variable.

The explanatory power of the physician casemix index varies dramatically between the two states, as evidenced by the R^2s in column 1 of the two tables. In New Jersey, CMI-B explains only 31 percent of the difference in average staff costliness, compared to 78 percent in North Carolina. Much more

TABLE 7-7

REGRESSION RESULTS FOR COSTLINESS AND GAINS OF MEDICAL STAFFS: NEW JERSEY

Explanatory Variable	DEPENDENT VARIABLE TOTB $\overline{X}$ = \$953 Std. Dev. = \$202			BGAIN (U/P)		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	387.1***	401.0***	-19.4	-4.0	-8.0	538.4**
CMI-B	585.6***	461.2***	435.9***			
URBAN		68.1	92.8**	59.1	59.2	39.8
TEACH		11.7	-7.6	50.7	51.5	76.7*
BEDGRP2		-5.9	-58.8	23.3	27.3	56.8
BEDGRP3		91.3	5.5	-89.2	-85.8	1.4
BEDGRP4		111.4	41.5	-110.8	-107.9	-31.1
OWNFP		38.2	36.8	-54.4	-55.3	-46.9
OWNGOV		29.9	101.1*	-51.4	-53.9	-121.9
DRGIND		-302.6**	-555.8***		18.0	-312.0
CONCIND		-20.4			-11.7	129.8
PCT SP2			370.1**			-605.2***
PCT SP3			658.0***			-786.5**
PCT SP4			667.6**			-666.8**
PCT SP5			955.1***			-920.6***
PCT SP6			160.7			-399.4
PCT SP7			873.0***			-1065.7
R^2	.31	.46	.61	.09	.09	.26
(F)	49.6	8.5	10.2	1.5	1.1	2.3
DFE	111	102	97	105	103	97

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1%level.

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

TABLE 7-8

REGRESSION RESULTS FOR COSTLINESS AND GAINS OF MEDICAL STAFFS: NORTH CAROLINA

Explanatory Variable	DEPENDENT VARIABLE: TOTB $\bar{X}$ = \$477 Std. Dev. = \$228			BGAIN (U/R)		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-208.2***	-213.6***	-171.9***	84.4***	89.9***	202.6***
CMIB	786.7***	681.7***	576.1***			
URBAN		44.4**	35.8*	82.6***	88.7***	106.1***
TEACH		58.4	64.0	-62.6	-61.7	-53.9
BEDGRP2		61.0**	37.5	-56.1**	-61.1**	-57.0**
BEDGRP3		121.5***	61.8*	-122.4***	-129.6***	-82.7**
BEDGRP4		127.3**	65.8	-122.3**	-133.3**	-84.3*
OWNFP		17.5	17.8	-33.2	-31.2	-1.0
OWNGOV		-13.7	-19.3	13.1	14.4	18.0
DRGIND		-42.3	-34.7		-53.2	53.2
CONCIND		-71.9			-2.7	-216.2***
PCT SP2			150.9***			-185.7***
PCT SP3			517.7***			-560.7***
PCT SP4			32.6			-28.4
PCT SP5			279.3*			-373.0***
PCT SP6			3541.0			-3747.6
PCT SP7			106.0*			-124.8**
R^2	.78	.83	.87	.23	.24	.44
(F)	476.8	63.7	52.9	5.6	4.4	6.6
DFE	136	127	122	130	128	122

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

variation exists in North Carolina to begin with: the CV for TOTB in New Jersey equals .21 (=$202/$953) vs. .48 (=$228/$477) in North Carolina. The latter's CMI-B also varies considerably more based on its standard deviation (=.26) compared to New Jersey's (=.19). Thus, with a more homogeneous physician casemix across New Jersey hospitals, other factors will likely play a larger role in explaining cost variances than in North Carolina.

This, too, is borne out by the relative increases in R^2s as more hospital and physician characteristics are included. In New Jersey these factors add 15 to 30 points to the power of the model compared to only 5 to 9 points in North Carolina. Surprisingly few of the characteristics are statistically significant in New Jersey, however. In equation (2), only DRGIND is significant, indicating that average costs fall where medical staffs concentrate on fewer DRGs. How many different attending physicians are involved in a staff's workload is unimportant, on the other hand.

Equation (3) shows what a strong role specialty plays in explaining costliness. If a staff were one standard deviation (=.14) above average in terms of internists (SP2), for example, average costs would be $48 (=370*.14) higher (assuming no other specialty shares were reduced except GPs/FPs). This is 5 percent of the mean figure of $953. With staffs dominated by "other surgical specialists" (SP5) one standard deviation (=.086) above average, mean costs would be $82(=955*.086) more, or 8.6 percent higher than average. And it must be remembered that DRG casemix, weighted by average physician costliness, is being held constant.

Similar results obtain in North Carolina, with the addition of specialty mix generally dominating hospital characteristics like teaching status, bedsize, and ownership. This is what we might expect when explaining variation in medical staff costliness alone.

The decline in the CMI-B coefficient when specialty is controlled for is also noteworthy in both states. This is due to the positive correlation between casemix and specialty. If only casemix is controlled for, part of its explanatory power is not inherently due to the kind of patient being treated but the regimen used. In other words, more complicated cases cost more, not only because they are indeed more complicated but also because they are more

likely to be treated by resource-intensive specialists. Where a complicated patient can be treated by, say, an internist, costs will be less. How much less? In New Jersey, the savings could be $300-600, or the difference between the SP2 coefficient and the SP3 and SP5 coefficients.

Gains Results

Putting costliness on a gains-per-admission basis provides an indication of the sources of systematic gains or losses. (See cols. 4-6, Tables 7-7 and 7-8). If no systematic cost biases existed, then no physician or hospital characteristic would be significant and the R^2 would approach zero. Such is practically the case in New Jersey unless specialty is controlled for. From this we can conclude that paying an urban-rural DRG rate would not produce systematic winners or losers among large, urban teaching hospitals, for instance, or by type of ownership.

When specialty is held constant, however, systematic biases appear, biases consistent with the costliness results just discussed. Staffs dominated by specialists would be systematic losers as expected. The specialty share coefficients suggest that a 1 point increase in a specialty's share relative to GPs/FPs would produce a $6-10 loss per admission (again around a mean of $953 in New Jersey). Offsetting this to some extent is the positive teaching coefficient of $76.70 per admission. Hence, highly specialized staffs in teaching hospitals would not lose as much as they would practicing in nonteaching hospitals. We also know from equation (5) that teaching hospital staffs in general would not lose--only if they happened to be extremely specialized.

North Carolina's situation is quite different in many respects. According to eqs. (4 and 5) in Table 7-8, small urban hospitals would be systematically large winners, *ceteris paribus*, while the gain falls uniformly through 200 beds, then is unchanged thereafter. Small rural hospitals would also win but only by about half their urban counterpart.

No teaching or ownership effects are evident, as in New Jersey, but similar specialty effects occur. These have the effect of reducing the loss occurring in larger hospitals, but not eliminating it.

Summarizing the results so far on a staffwide physician DRG payment, we find that physicians in voluntary teaching hospitals will not necessarily be losers. Neither will all staffs in urban areas. Staffs in small urban hospitals, in fact, could be big winners although this appears to vary by state. What apparently produces any major systematic gains or losses is hospital specialty mix. Staffs dominated by specialists almost assuredly will be big losers, even if they are paid the average DRG rate in urban or rural areas. Thus, controlling for within-DRG severity becomes a crucial issue on deciding on the equity of the system to specialists. If severity is similar across staffs within-DRG, then a fixed payment system will legitimately force specialists to reconsider the intensity of their treatment regimens, much like PPS is now doing for hospitals. If the estimated losses are really due to uncontrolled for severity differences and not arbitrarily intensive practice modes or simply high fees, then inequities arise from a flat payment that is blind to specialty differences.

7.6 Characteristics of Winning/Losing Joint Ventures

7.6.1 Overview of Issues

The alternative method of implementing MD-DRGs involves a single payment to cover the costs of both the hospital and the medical staff. This takes the preceding discussion one step further by defining a joint venture in which hospitals and physicians share the financial risk of treating Medicare patients. This approach has the added advantage of aligning the objectives of both these groups. The analysis follows the model established in section 7.4.2 where the gains and losses are presented on a hospital basis, a per admission basis, and a per physician basis. Although we present results based on both statewide and urban/rural rates, we focus our discussion on the latter. The following questions are addressed:

- How does the average gain or loss per admission and per physician vary by urban/rural location and by teaching status?
- Are there differences between the states?
- How do big winning and big losing "joint ventures" differ by specialty concentration, by DRG concentration, and by hospital characteristics?

7.6.2 Level and Variation in Gains (Losses) in a Combined DRG Payment For Joint Ventures

Table 7-9 shows the magnitude of the gains and losses of a payment for joint ventures using a state-wide average and an urban/rural average. We focus our discussion here on the latter. The method based on urban-rural averages produces a $533 loss per admission among all joint ventures in New Jersey. There are definitely some very big losers; at the 25th percentile there is an average loss per admission of $6228. There are few big winners, but urban and non-teaching hospitals in New Jersey appear slightly better off.

By contrast, North Carolina joint ventures make money on average, $220 per admission. Those in urban areas do especially well, $516 per admission, while their rural counterparts post a net gain of only $24. While teaching hospitals do lose an average of $159 per admission, this loss is small relative to the pooled A-B costs (average case payment = $2,462).

We present the average gain (loss) per physician for illustrative purposes only. By definition, a joint venture implies a sharing of risk and therefore any gains (losses) would be divided between the hospital and the medical staff. By sharing the financial risk with the hospital, each staff physician in New Jersey would lose an average of $504 with a substantial number of big winners and big losers. (The 25th percentile is a loss of $6167 and 75th percentile is a gain of $6523). In North Carolina, on the other hand, physicians would receive an average windfall gain of $7,047, with some physicians showing very large gains, as indicated by a 75th percentile value of $16,612, and only modest losses. Big dollar gains for North Carolina staff reflect not only large wins *in toto*, but also the smaller number of attendings who would share in those savings.

The big wins in the joint venture scheme are more likely to occur in North Carolina where the average gain represents 11 percent of total Medicare (hospital and physician) payments. In New Jersey this value is 0. The average gain in urban joint ventures in North Carolina is 18 percent of total Medicare payments. Their rural counterparts gain an average of 4 percent of their total Medicare payments. Urban and rural joint ventures in New Jersey, would experience little or no change in total Medicare payments, on the other hand.

TABLE 7-9

COMPARISON OF WINNING AND LOSING JOINT VENTURES USING STATE-WIDE AND URBAN-RURAL COMBINED MEANS

Joint-Reimbursement Basis for Hospitals and Physicians	Total		New Jersey		New Jersey		North Carolina		North Carolina	
	NJ (N=113)	NC (N=139)	Urban (87%)	Rural (13%)	Teaching (43%)	Non-Teaching (57%)	Urban (39%)	Rural (60%)	Teaching (11%)	Non-Teaching (88%)
Using Statewide Average										
Gain (loss) Total	$(23,409)	$344,351	$(144,046)	$759,440	$(680,295)	$460,564	$(163,813)	$666,828	$(2,109,507)	$663,552
Gain (loss) per Admission	(340)	353	(343)	(321)	(524)	(204)	118	506	(356)	447
75th quantile	404	664	352	604	276	474	601	697	178	677
50th quantile	(21)	481	(27)	91	(173)	126	235	533	(213)	497
25th quantile	(507)	101	(431)	(1315)	(867)	(360)	(208)	299	(858)	207
Gain (loss) per Physician	1344	14,282	309	8104	(3256)	4741	4912	20,413	(8137)	17,198
75th quantile	8917	25,460	7844	15,813	5256	11,114	12,775	19,466	3591	27,308
50th quantile	(321)	12,691	(352)	124	(3116)	471	4404	8425	(3404)	15,189
25th quantile	(5196)	3064	(5762)	(2903)	(13,688)	(2581)	(4324)	(11,799)	(17,092)	4527
Gain (loss) as % of Medicare $	2	15	1	15	(2)	9	5	26	(10)	23
Using Urban - Rural Averages										
Gain (loss) Total	$(213,981)	$285,265	$(244,568)	$(16,177)	$(858,134)	$251,792	$694,337	$(921)	$(1,437,914)	$509,418
Gain (loss) per Admission	(533)	220	(495)	(782)	(594)	(488)	516	24	(159)	269
75th quantile	275	591	302	138	166	284	1000	211	618	591
50th quantile	(82)	188	(64)	(214)	(250)	(34)	650	70	(71)	188
25th quantile	(6228)	(66)	(500)	(1771)	(860)	(449)	208	(147)	(834)	(49)
Gain (loss) per Physician	(504)	7047	(620)	249	(4428)	2334	14,922	1872	(4048)	8490
75th quantile	6523	16,612	7359	4148	4442	7636	21,917	9210	15,211	17,062
50th quantile	(1025)	5856	(1001)	(1429)	(4741)	(509)	15,193	2045	(2569)	6015
25th quantile	(6167)	(2443)	(6681)	(4340)	(15,411)	(3856)	4471	(4840)	(20,838)	(1786)
Gain (loss) as % of Medicare $	0	11	0	1	(4)	5	18	4	(6)	17

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

7.6.3 Characteristics of Big Winner and Big Loser Joint Ventures

The preceding discusses the large variation in gains and losses across joint ventures in both states. Table 7-10 shows the characteristics of the big winner and big loser joint ventures. Specifically we are interested in how the physician specialty mix and concentration, and the hospital characteristics compare among winning and losing joint ventures. The following conclusions may be drawn.

Distribution of Winners/Losers

About 12 percent of joint ventures in New Jersey and 14 percent of those in North Carolina fall into the big loser category. However, in New Jersey only three joint ventures (2.7 percent) are big winners while 16 percent of joint ventures in North Carolina are big winners. When comparing winners and losers, one should keep in mind that the class of big winners in New Jersey is quite small.

Specialty Mix

When the hospital and medical staff payment is combined, the specialty mix of winners generally does not vary from that of losers. For example, the dominance of GPs/FPs in winning medical staffs is not repeated here. Among big losers in North Carolina, GPs/FPs account for 32.2 percent of admissions, and 26.2 percent among big winners. Do joint ventures profit from surgical vs. medical admissions? The losers in North Carolina have an average admission rate of 17.4 percent from general surgeons while winners have 10.6 percent of their cases from this specialty. Admissions by other surgical specialties, however, are nearly equally represented in both winners and losers. In New Jersey, general surgeons are disproportionately represented in big winners (18.3% vs. 4.3% for losers), but this contrary result may be due to the very limited number of winners there. These finding suggest that unlike the medical staff model in which gains are very sensitive to the specialty concentration, specialty does not dominate the results when the hospital and physician payments are combined.

TABLE 7-10

ADMISSIONS BY SPECIALTY AND ANCILLIARY USAGE OF WINNING AND LOSING JOINT VENTURES USING URBAN-RURAL AVERAGE COST PER CASE

	Big Losers[a]		Big Winners[b]	
	New Jersey (n = 14)	North Carolina (n= 20)	New Jersey (n = 3)	North Carolina (n = 22)
Admission by Specialty				
GPs/FPs	8.4%	30.3%	26.1%	26.2%
Internists	40.0	32.2	32.4	26.6
Other Medical Specialists	14.5	2.9	5.5	1.4
General Surgeons	4.3	17.4	18.3	10.6
Other Surgical Specialists	12.1	9.2	13.1	11.4
Multi-Specialty Groups	10.7	.1	2.4	0
All Others	10.0	7.9	2.1	23.8
Average Cost Per Admission				
Consultants	$ 55	$ 17	$ 57	$ 13
Radiology	60	64	63	44
Other Tests	255	22	93	13
Other Surgery	85	56	66	48
Hospital Characteristics				
Average Bed Size	305	205	186	209
DRG Concentration Index	.107	.055	.166	.161
Physician Concentration Index	.154	.094	.237	.248
Percent Teaching	29	30	33	5
Percent Urban	79	25	100	100

[a]Big Losers are those medical staffs with loss per case more than 1 standard deviation from the mean.

[b]Big winners are those medical staffs with gains per case more than 1 standard deviation from the mean.

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

Utilization of Physician Services

These are surprisingly few real differences in physician service utilization between winers and losers. The only striking difference is an average cost of $255 for other tests among New Jersey losers compared to an average of $93 among the winners. Who wins and who loses may be driven primarily by differences in institutional costs.

DRG Concentration

A comparison of the DRG concentration indices suggests that admissions treated by the winners in both New Jersey and North Carolina are concentrated in fewer DRGs than those of the losers. These results may represent a confounding of teaching or urban effects, and thus need to be pursued in more detail in subsequent multivariate analyses.

Physician Concentration

The winners in New Jersey and North Carolina appear to be those joint ventures with relatively few physicians. How important this may be to the determination of winning or losing is unclear. This is consistent with Pauly's hypothesis that fewer physicians may result in more efficient use of resources, but other factors like casemix are not held constant here. We test this empirically in the regression analysis which follows.

7.7 Multivariate Analysis of the Variation in the Costliness of Joint Ventures

7.7.1 Research Questions

The research questions for the multivariate analysis of joint ventures are the same as for physician services alone, with one addition:

(1)-(4) same as in 7.5.1;

(5) Are hospital and physician costs per admission positively or negatively correlated? Does the correlation vary for medical vs. surgical DRGs? Does it vary across states?

7.7.2 DRG-specific Effects of Joint Ventures on Costliness

Correlation of Physician and Hospital Costs

It is rather complicated to determine in fact whether hospital and physician services are complements or substitutes. First, the unit of output is uncertain. Is it the admission, or the patient day? Severity of illness should be controlled for, but how? Analysis within DRG can help in this regard, but certainly some undetermined amount of within-DRG differences remain. Hence, positive correlations between hospital and physician costs even within DRG may be reflecting severity effects and not true complementarity. Second, hospitals and physicians are not cost minimizers; thus there is no reason to believe any observed hospital-physician input combinations reflect real trade-offs in production. Third, both physician and hospital costs contain a variety of inputs, some complementary, some substitutable. Consultant inputs, for example, may substitute for attending physician time while assistant surgeons complement head surgeons where one is absolutely necessary to perform the surgery.

Aggregating all inputs to two factors, physicians and hospitals, requires that the two be substitutes. This is not too helpful. Moreover, working with the admission as the unit of analysis almost guarantees a positive correlation as more days produces more opportunities for routine visits, consults, and ancillary testing. Nevertheless, it is instructive to see how correlated the two costs are, if only to show how payment rates might vary by DRG depending on whether a physician or joint physician-hospital payment were made.

Table 7-11 provides correlation coefficients for five DRGs in the two states. Performing the calculations within DRG avoids most of the upward bias introduced by severity; that is, more severe DRGs will usually require more of both physician and hospital inputs. Even within DRG, however, the correlations are all positive and significant at the 99 percent confidence level. They range from a low of .33 for lens procedures (DRG 39) in North Carolina to .74 for pneumonia cases (DRG 89) in New Jersey. The correlations appear higher for medical cases, but a broader range of DRGs are required to fully test for differences by type of case. With the exception of cholecystectomies and prostatectomies, the correlations are quite similar across states.

TABLE 7-11

CORRELATION COEFFICIENTS RELATING HOSPITAL AND PHYSICIAN COSTS FOR SELECTED DRGs

DRG		New Jersey	North Carolina
17	Nonspecific Cerebrovascular Dis w/o CC	.58	.58
39	Lens Procedures	.34	.33
89	Pneumonia Age 70+ and/or CC	.74	.67
195	Cholecystectomy w/CDE Age 70+ and/or CC	.64	.44
336	Transurethral Prostatectomy Age 70+ and/or CC	.65	.53

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

TABLE 7-12

CONTRIBUTION OF JOINT VENTURES TO VARIATION IN COSTLINESS PER CASE FOR CEREBROVASCULAR DISEASE AND CHOLECYSTECTOMIES BY STATE

	New Jersey		North Carolina	
	Cerebrovascular Disease	Cholecystectomies	Cerebrovascular Disease	Cholecystectomies
R^2 (P)	.090 (.0001)	.148 (.0001)	.155 (.0001)	.200 (.0001)
Coefficient Range	$7,542	$12,299	$6,383	$7,688
Number of Cases	9,563	2,786	8,237	2,555

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

Hospital Dummy Variable Analysis

To answer the question of how much interhospital variation exists in the combined Medicare A+B costs of joint ventures, an identical dummy variable regression was run on cerebrovascular disease and cholecystectomies. The results are shown in Table 7-12. Between 9 and 20 percent of the per case variation is explained by the hospital dummies (as well as the DRG identifiers). Their explanatory power is somewhat greater here for cerebrovascular disease than for just physician services alone while slightly less for surgery.

The range, however, is enormous among hospitals. Whereas average physician costs on a particular staff for treating cerebrovascular disease ranged $886 between the lowest and highest cost medical staffs in New Jersey, the range for hospital and physician services combined is $7,542. The range is about one thousand dollars less in North Carolina, but it is still over twice the mean cost ($2,823). Cholecystectomies show an even higher range which is partly due to higher average costs to begin with. Nevertheless, it is hard to understand why the combined costs for this surgery should range $12,299 in New Jersey after holding DRG case complexity constant.

7.7.3 Across-DRG Effects of Joint Ventures on Costliness and Gains

Next, we consider the interhospital effects on average costliness and gains when both hospital and physician costs across all cases are pooled to the hospital level. An identical regression specification to that in section 7.5.3 is used, allowing us to determine (a) how much of the total variation in joint costs can be explained by casemix and other characteristics and (b) the incidence of gains or losses by staff or hospital characteristics.

Costliness Results

Tables 7-13 and 7-14 give two sets of results for New Jersey and North Carolina with the same organization as before: three costliness equations, then three gains equations. The explanatory power of the casemix index alone ranges from only 4 percent in New Jersey to 50 percent in North Carolina, compared to 31 percent and 78 percent for just physician costs alone. The CVs

TABLE 7-13

REGRESSION RESULTS ON THE COSTLINESS AND GAINS OF JOINT VENTURES: NEW JERSEY

Explanatory Variable	DEPENDENT VARIABLE: TOTAB X = $4,331 Std. Dev. = 1,502			AB GAIN (U/R) Per Admission		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	3648.4***	2744.7***	3772.1**	-1638.4***	431.6	609.8
CMI-B	597.9**	620.5**	640.3**			
URBAN		270.0	11.5	-190.5	-250.2	-148.8
TEACH		1079.3***	876.9**	-419.6	-798.7***	-591.1**
BEDGRP2		-104.2	26.1	1654.8***	191.1	-104.4
BEDGRP3		-445.3	-404.2	1808.3***	384.1	-56.0
BEDGRP4		-499.1	-523.9	1760.7***	435.8	23.5
OWNFP		-397.3	-634.8	586.8	599.2	781.4
OWNGOV		625.9	307.4	-2065.8***	-736.2*	-213.1
DRGIND		4360.3***	3666.2**		-6807.3***	-7139.0***
CONCIND		2254.5*			-2505.7***	-3787.8**
PCTADSP2			-115.7			-199.8
PCTADSP3			3372.7			-4659.4***
PCTADSP4			-4392.7			2094.0
PCTADSP5			-2265.0			1646.0
PCTADSP6			1297.1			-424.4
PCTADSP7			-563.7			2514.3*
R^2	.04	.31	.36	.22	.53	.64
(F)	4.8	4.6	3.6	1.5	4.3	11.3
DFE	111	102	97	105	103	97

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1%level.

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

TABLE 7-14

REGRESSION RESULTS ON THE COSTLINESS AND GAINS OF JOINT VENTURES: NORTH CAROLINA

Explanatory Variable	DEPENDENT VARIABLE: TOTAB X = $2,462 Std. Dev. = 980			AB GAIN (U/R) Per Admission		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-3344.1***	-2723.0***	-2733.0***	57.1	46.5	319.4*
CMI-B	6284.7***	5462.1***	5488.4***			
URBAN		104.0	121.9	772.0***	769.1***	785.2***
TEACH		1210.7***	1232.3***	-962.9***	-963.3***	-946.7***
BEDGRP2		-45.7	-36.7	-29.3	-38.9	-76.3
BEDGRP3		-241.3	-224.6	-63.5	-71.6	-67.5
BEDGRP4		-151.1	-162.6	24.1	-13.5	8.7
OWNFP		136.8	246.6	-247.5*	-244.7*	-255.0*
OWNGOV		-146.9	-182.2	71.9	81.2	116.1
DRGIND		456.9	1142.1*		-444.9	-777.50
CONCIND		483.4			167.7	-74.0
PCTADSP2			354.6			-454.5*
PCTADSP3			1203.0			-1574.8*
PCTADSP4			168.4			-527.6
PCTADSP5			-1594.3			262.5
PCTADSP6			30531.1			-19262
PCTADSP7			-297.0			32.0
R^2	.50	.65	.66	.23	.39	.44
(F)	136.2	23.2	15.9	5.6	9.3	6.4
DFE	136	127	122	130	128	122

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1%level.

Source: Medicare Part A and Part B claims for New Jersey and North Carolina, 1982.

of joint costs per admission are .35 and .40, respectively, in New Jersey and North Carolina; thus, the degree of total cost variation is fairly similar across states. New Jersey's casemix variation, however, is far greater than North Carolina's when joint costs are used as weights. This is the opposite of what we found for the CMI-B index, implying a very different weighting scheme between the two indices. Apparently, a large random hospital component remains in New Jersey, for the CMI-AB explains very little of the interhospital variation.

Introducing hospital and physician characteristics indicates that teaching hospitals are significantly more costly _in toto_ per case in both states. Bedsize and ownership are insignificant once casemix is controlled for. Both physician and DRG concentration are positively related to joint costs in New Jersey but not in North Carolina. Thus, hospitals treating a narrower range of DRGs and/or with fewer attendings per admission appear more costly. That physician concentration is positively related to overall costs is counter to the Pauly (1980) hypothesis that fewer attendings should be more conscious of the hospital costs they are generating. A more disaggregated analysis of the relation between DRG concentration, casemix, and hospital-physician characteristics is needed to explain such findings.

Interestingly, when the hospital's specialty mix is included, none of the specialty dummies are significant in either state, unlike for physician costs alone. Either these costs are offset to some degree by lower hospital costs, which is unlikely given the earlier correlation analysis, or the random noise in institutional costs dominates in such a way as to hide any true relationship. When all variables are included, they explain 2/3 of the cost variation in North Carolina vs. only 1/3 in New Jersey, essentially due to the lack of explanatory power of casemix.

Gains Results

According to eq. (4), Table 7-13, larger hospitals would be winners in New Jersey. Government hospitals are big losers, holding bedsize and teaching status constant. Urban teaching hospitals _per se_ would not be losers unless they were large. In North Carolina, by contrast, teaching hospitals would uniformly lose although not by as much if they were in an urban area enjoying

the higher urban rate. For-profit hospitals would also lose, *ceteris paribus*, in North Carolina, which is unexpected.

The bedsize effect for New Jersey does not hold up when physician and DRG concentration are included. Concentrated medical staffs treating fewer DRGs would produce large losses under a joint payment. It is this characteristic and not bedsize that is separating winners from losers. But once again, these results are not robust across states, implying further study of the issue.

A couple of the specialty effects do achieve marginal significance in the gains equation. Their negative signs reinforce the finding on physician costs, pointing to a joint loss in specialty dominated hospitals. The effect is far weaker, however, indicating that a combined hospital-physician payment could offset major physician losses -- at least in some hospitals.

8.0 PATTERNS OF READMISSIONS

8.1 Overview

If a physician DRG payment system were implemented, there could be the opportunity for cost-shifting or fragmenting DRG packages by physicians in order to maximize revenues. This can occur in one of two ways: (1) performing diagnostic tests that have been included in the DRG package prior to admission and then billing fee-for-service for these tests; and (2) splitting one hospitalization into multiple admissions. In either case, total Medicare physician expenditures would increase. This chapter will concentrate on the potential for cost-shifting through readmissions. Pre-hospitalization utilization will be analyzed in detail in the next chapter.

There are a number of situations in which one admission could be potentially split into two. The physician uses his discretion in choosing a course of treatment. This decision is based on both the physician's style of practice and any economic incentives. Currently, under the fee-for-service system, there is no disincentive to treat a patient in one hospitalization rather than splitting it into two. However, some physicians may prefer the convenience of performing all necessary services during the same admission, while other physicians may prefer to treat the patient during two hospitalizations instead of one for clinical reasons. Often, either approach may be medically appropriate.

For this reason, it may be extremely difficult to effectively monitor readmission rates. Differences in styles of practice may lead some specialties (but not others) to split an admission. Practice styles may also vary across geographic areas. For example, there are two schools of medical thought when treating cholecystitis due to gallstones. The first school believes that a patient with cholecystitis should be treated medically, discharged (to stabilize the condition), then readmitted several weeks later for an elective cholecystectomy. The second school believes it is both safe and medically appropriate to perform a cholecystectomy during the initial hospitalization once the condition has stabilized. The patient's age, any complicating conditions as well as the number of available beds and physician supply also play a role in determining how many times a patient will be admitted for treatment of the same medical condition.

We constructed two analytic files (one for New Jersey and one for North Carolina) containing the admissions for those patients who were hospitalized more than once during 1982. With these files, we will explore the following questions:

(1) Are patients being readmitted to hospitals frequently, and do these patients account for a disproportionate share of total admissions and charges?

(2) Are readmission cases distributed across MDC groups any differently than are patients with a single admission?

(3) To what extent are patients being readmitted for the same medical condition; for a different condition but within the same MDC; for a different condition in a different MDC?

(4) How soon after being discharged from one hospitalization are patients being readmitted to the hospital?

(5) What future empirical analysis can be done to shed more light on the potential for cost-shifting?

8.2 Overall Trends in Patterns of Readmissions

We created analytic files for those patients in both states who had two or more admissions.* All data elements from the hospital-physician aggregate files were retained for this analysis. In New Jersey, 53,557 people were readmitted for a total of 138,261 hospitalizations while 49,010 people in North Carolina were admitted 128,425 times. (The total number of unique persons equalled 187,383 and 154,224 in New Jersey and North Carolina, respectively.)

Table 8-1 presents a frequency distribution for total Medicare admissions and physician costs. Interestingly, the results for the two states are almost identical. Roughly 70 percent of all unique patients had a single hospital admission during 1982. However, these patients accounted for only one-half of all Medicare admissions.** The one-third having two or more admissions represented the other half of all admissions. It is interesting to note that

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*Data for the initial admission was also included for each person.

**Total admissions in New Jersey and North Carolina were 272,087 and 237,639, respectively.

TABLE 8-1

MEDICARE ADMISSION AND PHYSICIAN COST SHARES FOR READMISSION CASES

Number of Admissions	Percent of Unique Patients		Percent of Medicare Admissions		Percent of Medicare Physician Costs	
	NJ	NC	NJ	NC	NJ	NC
1	71%	69%	49%	46%	51%	48%
2	19	20	26	26	28	28
3	6	7	12	13	12	13
4+	4	4	13	15	9	11

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

patients admitted four times or more, while representing just 4 percent of unique beneficiaries in each state, constituted 13 and 15 percent of all 1982 Medicare admissions in New Jersey and North Carolina, respectively.

Looking at the last two columns in Table 8-1, we see the breakdown of total Medicare inpatient physician costs by the number of admissions. Physician expenditures for 1982 totalled $268 million in New Jersey and $147 million in North Carolina. Roughly 50 percent of these expenditures were spent on the care of persons being readmitted. Again, those people entering the hospital more than three times represented a disproportionate share of total costs relative to the number of patients in this group.

8.3 Readmission Patterns Across MDC Groups

Readmissions were analyzed at the MDC level to determine whether or not the distribution of MDCs across readmissions was similar to the distribution for single admissions. The diagnostic mix across the MDCs looked virtually identical for both single and multiple admissions. For example, in New Jersey 25 percent of all readmission cases were classified into MDC #5 (diseases and disorders of the circulatory system) compared to 21 percent for the single admissions. Roughly the same scenario existed in North Carolina (23% of readmission cases versus 19% for single admissions). Approximately 50 percent of all readmissions in both New Jersey and North Carolina were classified into one of four MDCs (diseases and disorders of the nervous system, respiratory system, circulatory system, and digestive system).

The majority of cases (both single and multiple admissions) were classified as medical DRGs. Approximately 82 percent of readmission cases in New Jersey and 87 percent in North Carolina were classified as medical conditions. It would appear that people entering the hospital more than once suffer from re-occurring medical conditions.

To determine if this was indeed the case, we examined in greater detail the first and second admissions for all individuals being admitted more than once. We concentrate here on only the first two admissions, leaving the "multiple" readmissions for future analysis.

We began by simply looking at the MDC classification for a patient's first admission and comparing it with the MDC classification for the second time he/she was admitted. The percent of patients classified into the same MDC for both admissions and those classified into two different MDCs are presented for

New Jersey in Table 8-2.* Approximately 32 percent of the cases were readmitted into the same MDC medical or surgical class (e.g., 25% medical to medical and 7% surgical to surgical). Patients admitted first to a medical (surgical) DRG and then readmitted in a surgical (medical) DRG within the same MDC group accounted for an additional 5 percent of the cases.

TABLE 8-2

MDC CLASSIFICATION FOR FIRST AND SECOND ADMISSION IN NEW JERSEY

	Second Admission			
	Same MDC		Different MDC	
	Surgical	Medical	Surgical	Medical
First Admission				
Surgical	7%	2%	6%	12%
Medical	3	25	11	34

The remaining 63 percent was attributed to those patients who were admitted first into one MDC, discharged, then readmitted and classified into a different, seemingly unrelated MDC. Yet how unrelated was this second MDC? In both states, we identified definite patterns of MDC-shifting. For example, 3 percent of the cases involved people moving from MDC #1 (disorders of the nervous system) to MDC #5 (circulatory system disorders) and vice versa. Further investigation into these patterns of movement will be presented in section 8.4.5

8.4 Scenarios of Medically-Acceptable Readmissions

We saw in the preceding section that 37 percent of second admissions were for conditions within the same MDC group as the first admission. It seems

*For illustrative purposes we present only the results for New Jersey. This table was virtually identical for North Carolina.

reasonable to assume that the two hospitalizations may be related in some way. To examine this, we decided to examine four different scenarios:

(1) patient has major surgery in first and second admission (both in same MDC):

(2) patient diagnosed with chronic medical condition in first and second admission (both in same MDC);

(3) patient diagnosed with acute medical condition in first and second admission (both in same MDC); and

(4) patient diagnosed with medical condition in first admission and has major surgery in the second admission (both in same MDC).

A fifth scenario was added to show the extent of MDC-shifting (i.e., a person is admitted for a condition in one MDC then readmitted for a condition in another MDC).

These scenarios represent a range of potentially "splittable" admissions under the current Medicare system. Using actual cases from the readmissions files, we examined the readmission patterns for these five different situations. It is uncertain whether these patterns would change under a physician DRG payment system. The cases chosen only provide an illustrative example of existing readmission patterns.

8.4.1 Two Surgical Admissions

First, we examined those cases in North Carolina and New Jersey where the patient was admitted twice for eye surgery. Table 8-3 presents the physician costs for both surgical admissions. Here is an example of two related surgeries that are virtually indistinguishable in terms of costs, the number of services provided, and lengths of stay. In 90 percent of the cases the same ophthalmologists performed both eye surgeries. Examining the surgical procedures performed, we found 18 percent of North Carolina patients and 37 percent of those in New Jersey had a single lens extraction done during the first admission and again during the second hospitalization (presumably on the second eye).

TABLE 8-3

COMPARISON OF FIRST AND SECOND ADMISSIONS FOR EYE SURGERY (MDC #2)[a]

	New Jersey		North Carolina	
	First Admission	Second Admission	First Admission	Second Admission
	(N=560)		(N=726)	
Surgeon	$1,186 (1.00)	$1,253 (1.00)	$1,052 (1.00)	$1,101 (1.00)
Anesthesiologist	223 (1.00)	230 (1.00)	116 (1.00)	122 (1.00)
Assistant Surgeon	243 (0.72)	262 (0.70)	203 (0.02)	248 (0.03)
Other Surgery	684 (0.03)	606 (0.03)	372 (0.06)	354 (0.05)
Routine Hospital Visits	73 (0.60)	71 (0.57)	83 (0.07)	67 (0.04)
ICU Visits	83 (a)	69 (0.01)	39 (a)	--
Consultations	76 (0.45)	78 (0.40)	49 (0.11)	50 (0.09)
X-Rays	14 (0.89)	14 (0.68)	16 (0.81)	19 (0.44)
Other Tests	17 (0.88)	18 (0.85)	9 (0.76)	10 (0.52)
Total MDDRG Cost	$1,536	$1,598	$1,213	$1,255
Length of Stay	4	4	4	4

[a]All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

[b]Frequency less than one percent.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

Relatively few patients (4-9 percent in both states) are being readmitted immediately after being discharged from their first admission. In fact, the average duration between the date of discharge of the first admission and date of admission for the second is roughly 110 days for both states. This reflects the nature of this kind of surgery (i.e., elective versus emergency). It appears that ophthalmologists are allowing their patients to completely recover from the surgery on one eye before operating on the second.

8.4.2 Two Admissions for a Chronic Medical Condition

The next two situations involve patients who were readmitted for the same medical condition as their first admission. For our purposes, we chose a chronic condition (respiratory neoplasm) and an acute condition (pneumonia). Table 8-4 presents the physician inpatient costs for both medical conditions for New Jersey. (Data for North Carolina are not presented since the results were similar to those found in New Jersey.)

There were 345 people in New Jersey who were classified into the respiratory neoplasm DRG both for their first and second admissions. Caution should be used when comparing the costs for the two admissions since the first admission is not necessarily the admission when the disease was first diagnosed. However, the data indicate that the first admission was much more intensive in terms of the amount of diagnostic surgery and other tests which were performed. There were also more ICU visits, routine visits by other physicians, as well as more consultations during the first admission. The total physician DRG cost for the first hospitalization was nearly $300 more than the second admission. In roughly 70 percent of the cases, the attending physician was the same for both admissions.

It is very difficult to monitor readmissions for chronic conditions simply because there are no clearly defined lengths of stay. However, under PPS, all cases in which the person was readmitted within one week of discharge have to be reviewed by PROs for the possibility of mistreatment of care. In the respiratory neoplasm readmissions, we found that 18 and 27 percent of the patients in New Jersey and North Carolina, respectively, were readmitted within one week. What can be the reasons for this high rate of immediate readmission? These people could be in the last stages of the disease. Both the attending physician and family may feel that it is best to get the patient out of the hospital environment for as much time as possible. The physician may actually be treating the patient only to the point where he/she is well

TABLE 8-4

COMPARISON OF FIRST AND SECOND ADMISSIONS FOR RESPIRATORY NEOPLASM AND PNEUMONIA[a]

	New Jersey			
	Respiratory Neoplasm (N=345)		Pneumonia (N=181)	
	First Admission	Second Admission	First Admission	Second Admission
Routine Hospital Visits-Attending MD	$ 294 (1.00)	$ 285 (1.00)	$ 289 (1.00)	$ 273 (1.00)
Routine Visits Visits-Other MDs	92 (0.41)	105 (0.30)	105 (0.29)	114 (0.28)
ICU Visits	147 (0.52)	161 (0.24)	155 (0.09)	208 (0.08)
Consultations	128 (0.70)	114 (0.45)	106 (0.42)	114 (0.46)
Diagnostic Surgery	380 (0.52)	200 (0.24)	384 (0.16)	259 (0.22)
X-Rays	166 (0.97)	117 (0.92)	67 (0.98)	59 (0.99)
Other Tests	83 (0.91)	67 (0.84)	60 (0.93)	74 (0.93)
Total MDDRG Cost	$862	$589	$599	$555
Length of Stay	14	13	14	13

[a]All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

enough to go home, even if it is for a short time. More likely it is just that these patients are very ill and have a host of complicating conditions. It may very well be the case that the primary diagnosis was listed as lung cancer yet the readmission was for some complication directly related to the cancer (e.g., pneumonia, liver failure, seizures). Further investigation into this matter will be made during the second year of the project.

8.4.3 Two Admissions for an Acute Medical Conditions

Table 8-4 also compares the first and second admissions in New Jersey for an acute illness (pneumonia). We would expect that the two episodes are generally unrelated, since pneumonia is an acute condition. Yet, the fact that 20 percent of the cases were readmitted within one week of discharge suggests the opposite is true.* A logical explanation could be that the patient appeared medically well enough to go home (i.e., fever was lowered, cough disappeared) but once home they suffered a relapse because of not taking care of themselves properly. The two admissions appear identical in both costs and frequency of services performed and visits provided. Approximately three-fourths of the patients had the same attending physician during both hospitalizations. In those cases where there was a change in the attending physician, it appeared that more specialized physicians were taking over (e.g., GPs/FPs turning the care of their patients over to internists and pulmonary disease specialists).

8.4.4 Initial Medical Admission with Subsequent Surgery

The next scenario we present is the case where the patient is first admitted for a medical condition, discharged; then readmitted to have a major surgical procedure performed. Both admissions are in the same MDC here, and hence there is a good possibility that the surgical admission was related to the initial admission. We chose to look at those patients classified into medical DRGs #204-208 (diseases and disorders of the pancreas, liver and biliary tract) for their first admission, and who were then admitted into one of six surgical DRGs (#193 - #198) for a biliary tract surgical procedure or cholecystectomy. What is important here is the extent to which the two admissions could have been combined. On average, these people were readmitted

*The average duration between date of dischage of first admission and date of admission for the second was 68 days in North Carolina and 75 days in New Jersey.

4 to 6 weeks after being first discharged from their first admission. Roughly one-fourth of these cases were readmitted within one week of the first admission to have an operation involving the same body system. It is highly probable that these people had surgery directly related to their first hospitalization.

The two admissions are not directly comparable since the first was for a medical condition and the second admission was for surgery. Instead of comparing total physician costs and utilization, we looked at the costs generated by the two attending physicians during both admissions. We found that in less than ten percent of the cases the attending physician was the same physician for both hospitalizations. Generally, GPs/FPs and internists are in charge of the patient's care during the initial admission. Once the patient is readmitted for surgery, there is a shift in the specialty of the attending from GPs/FPs and internists to general surgeons. We were interested in whether or not these same general surgeons were involved in some way during the initial medical admission. Conversely, did the GPs/FPs and internists who had primary responsibility during the first hospitalization also play a role in the care of the patient during the surgical admission?

Table 8-5 below shows the Medicare physician costs for the surgical and medical attendings. In New Jersey, the medical attending received $212 for providing routine hospital visits, ICU visits and performing diagnostic surgery during the first admission. These same physicians provided additional care when the patient was readmitted for surgery, and received an additional $229 on average.

TABLE 8-5

ATTENDING PHYSICIAN COSTS FOR INITIAL MEDICAL ADMISSION AND SUBSEQUENT SURGERY

	New Jersey (N=166)		North Carolina (N=199)	
	Medical Admission	Surgical Admission	Medical Admission	Surgical Admission
Medical Attending	$212 (1.00)	$229 (0.52)	$158 (1.00)	$176 (0.29)
Surgical Attending	71 (0.41)	1,007 (1.00)	49 (0.30)	778 (1.00)

The medical attending was somewhat less likely to be involved in the surgical admission in North Carolina relative to New Jersey (29% vs 52%). Yet in both states they received more for providing secondary care during the surgical admission than they did for providing primary care during the medical one.

We found the surgical attending to be involved in many of the initial hospitalizations, providing surgical consultations and/or performing diagnostic surgery. Compensation here was far less than that for the surgical admission. Future work in this area might involve comparing costs and utilization for people who had a surgical procedure once during a six month period and those who had a medical admission followed by a surgery admission.

8.4.5 Patterns of MDC-Shifting

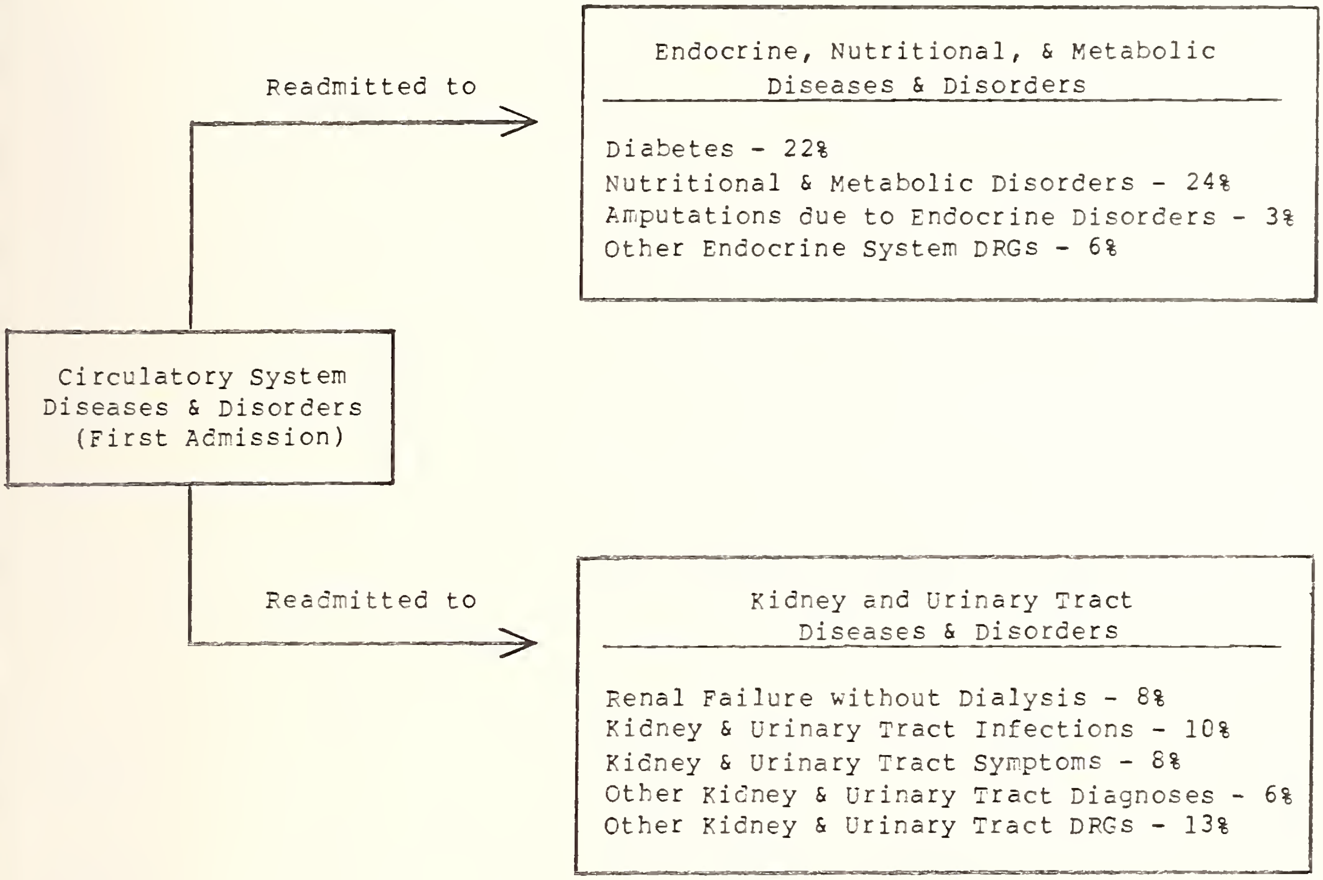
We selected three MDCs to look at readmissions for a condition not classified in the same MDC as the first admission. More specifically, we selected all cases where the first admission was in MDC #5 (disorders and diseases of the circulatory system) and the second admission fell into either MDC #10 (endocrine, nutritional and metabolic diseases and disorders) or MDC #11 (diseases and disorders of the kidney and urinary tract). For simplicity only the results for New Jersey will be presented as the results were similar in both states.

There were 382 cases in which the patient was first admitted into MDC #5 then readmitted into MDC #10. Figure 8-1 presents the patterns of MDC-shiftings that developed. Approximately 22 percent of the second admissions were for diabetes (DRGs #294-295). An additional 24 percent were classified into DRGs #296-#298 (nutritional and metabolic disorders). Looking at a specific circulatory system disease, we found 7 percent of all cases were diagnosed as having heart failure in their first hospitalization and diabetes in their second.

We also examined MDC cross-shifting from the circulatory system to the kidney and urinary tract system. In New Jersey, 315 people were admitted first to MDC #5 then readmitted a second time for a condition in MDC #11. We found 26 percent of cases were readmitted for some sort of kidney or urinary tract infection. Eight percent of the readmissions were for renal failure without dialysis. It is not necessarily the case that the circulatory

FIGURE 8-1

MDC-SHIFTING FROM CIRCULATORY SYSTEM DISORDERS TO ENDOCRINE SYSTEM OR KIDNEY AND URINARY TRACT DISORDERS



system disorder is related to any urinary tract infection, except that the person is older and somewhat more prone to developing complicating conditions.

8.5 Conclusions and Future Work

The potential for cost-shifting by readmitting patients is unknown under a physician DRG payment system. The five scenarios have shown us that in 1982 there were a number of instances when patients were being readmitted, some for conditions clearly related to their initial admission, others less so. However, because of the nature of these illnesses and a wide range of medically-appropriate styles of practice, any cost-shifting through readmissions would be extremely difficult to identify.

We mentioned earlier the percent of cases in each scenario when the patient was readmitted within one week of discharge. Table 8-6 presents a frequency distribution of the duration between first and second admissions for all New Jersey cases. (North Carolina had similar results and therefore is not presented.) Under the current fee-for-service system, fourteen percent of all readmissions occurred within seven days. Over one third of the patients were readmitted within 30 days of discharge.

TABLE 8-6

FREQUENCY DISTRIBUTION OF TIME DURATION BETWEEN DISCHARGE AND READMISSION: NEW JERSEY

Duration (in days)	Percent of Cases
7 or less	14%
8-14	8
15-21	7
22-30	8
31-60	18
61-90	12
90+	33
	100%

If a DRG payment system were initiated for physicians, it is unclear if these percentages would change, if at all. One method of checking for potential cost shifting would be to review those cases when there was a short period of time between admissions (e.g., less than one week). However, since there are already so many cases when a patient is readmitted within a short period of time, assessing medical inappropriateness would be very time-consuming.

Our future work rests on analyzing in greater depth the readmissions in New Jersey and North Carolina (as well as those in Washington state and Michigan). More specifically, we might take an alternative approach and analyze readmissions for only those people being admitting during the first six months of 1982. The analysis shown here presented an underestimation of the true rate of readmissions since it was only based on the 1982 calendar year. For example, there could be patients who were admitted sometime during 1981 but only once in 1982. These people were not included in our readmission analysis even though their admission in 1982 was actually a readmission. (The converse exists for patients first admitted during 1982 and their second admission occurred in 1983.)

In addition to the future work noted in the previous sections, we want to trace the care of patients for their third and fourth, etc., admission in a manner similar to the way we looked at the first and second admissions for all readmission cases. The strong patterns of MDC-shifting which were apparent in our analysis will also be explored in greater detail. We discovered a high mortality rate for the people being readmitted (11-16% in the two states). Would our results differ once these presumably sicker and older patients were dropped? Finally, we will simulate the impact of splitting admissions on total physician costs.

9.0 THE UTILIZATION OF SERVICES OUTSIDE THE HOSPITAL

9.1 The Potential for Cost Shifting

Because physician DRGs fix the level of payment for a hospital stay, incentives are created for the physician to restrain the level of services provided. One way this might be accomplished is for the physician to refrain from the use of services that are of marginal value in specific cases. However, a DRG reimbursement system that covers only the hospital stay may also encourage the physician to shift the provision of some services outside the hospital stay, where they can be billed for separately and thereby decrease the demands on the fixed DRG payment.

The possibility of shifting presupposes that there is some substitutability between hospital and nonhospital care. This substitutability is supported by the findings of such researchers as Davis and Russell (1972) and Hellinger (1977). For any given hospital stay, the degree to which visits, consultations, x-rays, lab tests, or other services can be shifted depends on whether:

- the length of stay in the hospital can be shortened, thereby allowing services to be provided at the same time following the onset of the condition, but in a nonhospital setting;
- the services can retain the same value if they are moved up or postponed, thereby transfering them out of the hospital without altering the length of stay; and
- the hospital stay results from a situation with a sudden onset, that limits the possibilities for prehospital utilization.

If the potential for shifting is considered important, then one might want to evaluate the advantages and disadvantages of extending the package payment to include an interval preceding and following the hospital stay.

In this chapter, we analyze data on out-of-hospital utilization in an attempt to answer the following questions:

(1) How important are costs incurred just before and after the hospital stay when compared to physician costs during hospitalization?

(2) What are the specific components of the pre and posthospital care provided?

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(1) How important are costs incurred just before and after the hospital stay when compared to physician costs during hospitalization?

(2) What are the specific components of the pre and posthospital care provided?

(3) To what degree are the attending and other physicians involved in providing out-of-hospital care, and what are the implications of this involvement for potential shifting?

(4) To what degree does the current variation in out-of-hospital utilization indicate the substitutability of pre or post care for care provided during the hospital stay?

Our ability to answer question (4) is limited by our current data set. Services are described at a moderate level of detail, and it is not possible to determine with certainty whether services provided outside of the hospital stay are related to the period of hospitalization. Also, the data are for a single year, which means that evidence of substitution must result from local or personal differences in the practice preferences of physicians, or the environment (specific payment methods, for example) in which they practice. Because most of the cases analyzed reflect payment of the physician on a fee-for-service basis, the results under a physician DRG system might be substantially different. However, at the least, the results presented here can serve as a baseline for future comparisons.

9.1.1 The Pre and Posthospital Intervals Defined

There is an obvious tradeoff involved in defining the time period used to analyze pre and posthospital utilization. Lengthening the period insures that a greater portion of costs related to the hospitalization will be captured. However, it also increases the probability that utilization not related to the specific treatment episode will be incorrectly included in the analysis. The analysis interval may even end up including another hospital spell, or follow-up treatment of a previous hospital spell.

The analysis presented here covers physician reasonable charges and utilization for a one week period preceding and a one week period following hospitalization. This represents a conservative approach to analyzing the potential for cost shifting -- that is, the probability of including costs unrelated to the hospitalization is lessened.* Some costs that are related to the hospital stay will be excluded by our use of a one week interval, but as

*In the Medi-Cal program, a provision in its hospital contracts uses an even shorter interval. Under these contracts the program pays a fixed per diem rate for hospital stays, and no additional bill can be presented for outpatient department services that are utilized by a patient during the 24 hour interval just prior to admission (California Department of Health Services, 1983).

was indicated in Section 3.2, for the DRGs that were analyzed the majority of costs that occur during a one month interval preceding hospitalization actually are incurred within the last week prior to the hospital stay.

9.2 The Contribution of the Pre and Posthospital Intervals to Total Physician Costs

An important question to be addressed in this chapter is: What are the magnitudes of pre and posthospital costs relative to in-hospital physician costs, and what happens to the variability of costs when pre and post intervals are included? Table 9-1 provides some answers to these questions. It indicates that for almost all of our high volume DRGs, in the prehospital interval physician costs in both New Jersey and North Carolina are in the $20-40 range. In North Carolina, posthospital costs are much lower and also span a small range. However, in New Jersey there is wide variation in posthospital costs, ranging from a low of $7 for lens procedures (DRG 39) to a high of $74 for specific cerebrovascular diseases and transient ischemic attacks (DRGs 14 and 15).

Pre and post costs are small relative to physician hospital costs -- generally less than 5 percent for surgical DRGs and 10-15 percent for medical DRGs. When pre and post costs are added to physician costs in the hospital, the coefficients of variation for most DRGs remain largely unaffected, increasing or decreasing by only a few percentage points. (This can be verified by comparing the CVs in Table 9-1 to the CVs presented in Table 4-1).

These results have implications for the period to be covered by a physician DRG payment system. They indicate that the package payment could be expanded to cover the week prior to and the week following hospitalization without a substantial increase in the payment level. Furthermore, such an expansion of the interval covered by the payment would not generally increase the variability of payments within a DRG, as measured by the coefficient of variation. At the same time, better protection would be provided against the possibility of cost shifting.

TABLE 9-1

AVERAGE PHYSICIAN COSTS FOR HOSPITAL AND OUT OF HOSPITAL INTERVALS

DRG		New Jersey				North Carolina			
		Inpatient Physician Costs	Pre-Hospital Physician Costs	Post-Hospital Physician Costs	Total Physician Costs[a]	Inpatient Physician Costs	Pre-Hospital Physician Costs	Post-Hospital Physician Costs	Total Physician Costs[a]
14	Specific Cerebrovasc Dis exc TIA	$ 763	$21	$74	$ 858 (0.72)	$ 414	$24	$18	$ 456 (0.83
15	Transient Ischemic Attacks	575	22	74	671 (0.76)	343	27	22	394 (1.12)
16	Nonspecific Cerebrovasc Dis w/ CC	737	18	59	814 (0.71)	--	--	--	-- --
17	Nonspecific Cerebrovasc Dis w/o CC	592	22	59	673 (0.82)	370	24	18	412 (0.98)
39	Lens Procedures	1,842	23	7	1,872 (0.26)	1,293	30	9	1,332 (0.22)
89	Pneumonia Age 70+ &/or CC	603	33	32	668 (0.86)	320	25	12	357 (0.90)
90	Pneumonia Age 18-69 w/o CC	562	32	37	631 (0.99)	310	28	15	353 (0.95)
115	Perm Pacemaker Implant w/AMI or CHF	2,594	28	44	2,666 (0.28)	1,715	29	18	1,762 (0.29)
116	Perm Pacemaker Implant w/o AMI or CHF	2,259	34	40	2,333 (0.30)	1,572	41	22	1,635 (0.29)
127	Heart Failure & Shock	573	25	26	624 (0.84)	348	27	13	388 (0.91)
132	Atherosclerosis Age 70+ &/or CC	544	25	28	597 (0.78)	374	24	13	411 (1.19)
133	Atherosclerosis Age 70 w/o CC	592	23	36	651 (1.34)	443	27	13	483 (1.33)
140	Angina Pectoris	468	24	23	515 (0.98)	331	26	12	369 (1.46)
148	Major Bowel Procs Age 70+ &/or CC	2,555	43	22	2,620 (0.39)	1,673	36	15	1,724 (0.90)
149	Major Bowel Procs Age 70 w/o CC	2,438	49	23	2,510 (0.36)	1,591	41	14	1,646 (0.34)
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	588	28	24	640 (0.81)	330	23	11	364 (0.93)
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	573	32	38	643 (0.84)	332	26	14	372 (0.90)
195	Cholecystectomy w/CDE Age 70+ &/or CC	2,200	28	21	2,249 (0.31)	1,493	26	12	1,531 (0.30)
196	Cholecystectomy w/CDE Age 70 w/o CC	1,980	24	17	2,021 (0.30)	1,430	34	18	1,482 (0.29)
197	Cholecystectomy w/o CDE Age 70+ &/or CC	1,855	30	15	1,900 (0.38)	1,246	29	8	1,283 (0.30)
198	Cholecystectomy w/o CDE Age 70 w/o CC	1,631	30	9	1,670 (0.32)	1,182	30	7	1,219 (0.26)
209	Major Joint Procedures	2,842	19	29	2,890 (0.33)	2,576	14	11	2,601 (0.24)
294	Diabetes Age 36+	533	28	32	593 (0.88)	302	25	14	341 (0.90)
336	Transurethral Prostatectomy Age 70+ &/or CC	1,679	30	16	1,725 (0.30)	1,219	28	11	1,258 (0.24)
337	Transurethral Prostatectomy Age 70 w/o CC	1,545	26	12	1,583 (0.23)	1,174	31	14	1,219 (0.23)

[a]CVs in parentheses.

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

9.2.1 Decomposition of the Change in the Coefficient of Variation

The relative constancy of the coefficient of variation before and after out-of-hospital costs are added to in-hospital physician costs is an important result. This finding indicates that adding these costs will most likely not increase the proportion of physicians who are big winners or losers under a physician DRG payment system. It is therefore worthwhile to examine in greater detail the factors that can produce a change in the CV.

A number of factors affect the CV when we add pre and post costs to physician costs in the hospital:

(1) the CV of the out-of-hospital component being added;

(2) the correlation of this component with the in-hospital physician costs to which it is being added; and

(3) a purely statistical effect that results from adding one variable (pre and posthospital costs) that has some random variation to another variable (in-hospital physician costs) that also has some random variation.

In addition, the average level of costs being added will influence the magnitude of the effects of these three components. As indicated in Table 9-1, pre and post costs are small relative to in-hospital physician costs, so the components would not be expected to have a large impact on the CV of total physician costs.

The CVs of pre and posthospital costs are greater than 1.00 for all except one of our high volume DRGs, the sole exception being lens procedures (DRG 39) in North Carolina. Also, in all cases except one (angina (DRG 140) in North Carolina), the CVs for these costs are greater than the CVs for in-hospital physician costs alone. Therefore, the first component will tend to increase the CV of the sum of these costs.

Analysis of selected DRGs reveals only an occasional significant negative correlation between pre and posthospital costs and physician costs during the hospital stay. Furthermore, some small but positive correlations are also found. Therefore, this second component will have little impact on the CVs. (These correlations will be discussed in greater detail in Section 9.5, which analyzes Medicare claims data for empirical support of the substitution of out-of-hospital care for in-hospital care.)

The final component, the statistical effect of adding together two variables that incorporate random elements, will always act to lower the CV of the sum of the two variables.

When all three components are taken together, it appears that the effect of the third component, which lowers the CVs, largely cancels out the effect of the first component, which raises the CVs, while the second component has little impact. For example, let us take pneumonia (DRG 89) in New Jersey. The CV of in-hospital physician costs is 0.88, clearly much smaller than the CVs for prehospital costs (1.63) and posthospital costs (1.90), so the CV will increase when these costs are added. The correlation between in-hospital physician costs and and prehospital costs is -0.005, and between in-hospital physician costs and posthospital costs is 0.138, both small numbers unlikely to affect the CV of total physician costs. When pre and posthospital costs are added to in-hospital physician costs, the CV falls slightly from 0.88 to 0.86, indicating the countervailing impact of the statistical effect that results from summing the two variables.

9.3 The Components of Pre and Posthospital Costs

In the previous section we found that pre and posthospital costs were small relative to physician costs in the hospital. Even though these out-of-hospital costs are low, they vary greatly from case to case. In this section we will explore this variation by analyzing the data in greater detail.

9.3.1 Utilization and Average Costs

One source of variability in pre and posthospital costs is the distinction between those cases where there is no such utilization at all, as opposed to those cases where costs are present. For example, a low average cost may be masking a low overall utilization rate combined with a high cost for those cases that actually utilize pre and posthospital care.

This distinction is probed in Table 9-2, which presents data for our high volume DRGs on the percent of cases with pre and posthospitalization costs, as well as the average cost for those cases with such utilization. For New Jersey, the percentage of cases with prehospital costs spans a fairly narrow range -- from 37 to 56 percent. For North Carolina, the prehospital utilization percentages cover a wider range, and in almost every case the percentages are higher than in New Jersey, but average costs are lower.

TABLE 9-2

FREQUENCY AND LEVEL OF PRE AND POSTHOSPITALIZATION COSTS

DRG		New Jersey				North Carolina			
		Pre		Post		Pre		Post	
		% of Cases	Average Cost	% of Cases	Average Cost	% of Cases	Average Cost	% of Cases	Average Cost
14	Specific Cerebrovasc Dis exc TIA	39.1%	$53	41.1%	$180	55.7%	$42	28.1%	$65
15	Transient Ischemic Attacks	42.9	51	41.4	180	62.2	44	32.7	68
16	Nonspecific Cerebrovasc Dis w/ CC	41.0	45	41.0	143	--	--	--	--
17	Nonspecific Cerebrovasc Dis w/o CC	40.7	53	40.0	148	56.0	43	28.0	66
39	Lens Procedures	37.8	62	11.3	65	34.7	85	11.9	73
89	Pneumonia Age 70+ &/or CC	55.2	59	36.9	86	62.9	39	29.9	40
90	Pneumonia Age 18-69 w/o CC	51.9	62	37.9	109	67.2	41	35.4	41
115	Perm Pacemaker Implant w/AMI or CHF	47.6	59	40.3	109	65.3	44	37.5	49
116	Perm Pacemaker Implant w/o AMI or CHF	53.5	63	44.4	89	62.9	65	39.3	56
127	Heart Failure & Shock	48.6	52	30.2	87	65.9	40	30.8	43
132	Atherosclerosis Age 70+ &/or CC	50.6	50	31.9	88	62.8	39	26.0	49
133	Atherosclerosis Age 70 w/o CC	47.5	48	32.8	109	62.6	44	27.4	49
140	Angina Pectoris	48.6	50	30.3	77	65.6	40	29.3	44
148	Major Bowel Procs Age 70+ &/or CC	52.2	83	24.0	91	59.2	61	22.4	65
149	Major Bowel Procs Age 70 w/o CC	53.2	92	21.4	107	57.8	70	19.2	71
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	51.3	54	30.7	79	60.0	38	26.1	43
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	52.7	60	34.0	113	62.2	42	29.6	48
195	Cholecystectomy w/CDE Age 70+ &/or CC	49.0	58	23.9	89	57.4	45	23.9	49
196	Cholecystectomy w/CDE Age 70 w/o CC	41.9	57	20.5	82	60.3	56	23.0	77
197	Cholecystectomy w/o CDE Age 70+ &/or CC	46.3	65	20.1	73	56.8	52	16.8	51
198	Cholecystectomy w/o CDE Age 70 w/o CC	42.6	70	18.5	50	54.0	56	15.7	43
209	Major Joint Procedures	37.9	51	31.9	91	27.6	49	21.6	49
294	Diabetes Age 36+	56.3	50	37.6	85	64.8	38	33.8	42
336	Transurethral Prostatectomy Age 70+ &/or CC	45.7	66	19.5	80	56.7	49	16.3	69
337	Transurethral Prostatectomy Age 70 w/o CC	40.4	65	14.6	85	54.0	58	16.7	84

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

A different picture is found for the percentage of cases with posthospital utilization. For most DRGs in Table 9-1, posthospital rates are greater in New Jersey than in North Carolina, and the average cost is also greater, often reaching approximately twice the average North Carolina charge. Of particular note is the substantial difference for specific cerebrovascular disease (DRG 14) and transient ischemic attacks (DRG 15), where the average cost in New Jersey is over two and a half times the average North Carolina cost. This disparity will be analyzed in more detail in the next section.

When surgical and medical DRGs are compared, we find that medical DRGs have a slightly higher rate of posthospital utilization in both states, and a higher rate of prehospital utilization in North Carolina. These patterns of utilization probably reflect the fact that some degree of packaging already occurs for surgical procedures. The cost of follow-up visits by the surgeon are usually included in the cost of the surgery, and in some cases prehospital visits may also be included.

These results indicate that the low costs of pre and posthospital care reflect the fact that a substantial percentage of cases have no such utilization at all, while the remaining cases have higher average costs than the figures presented in Table 9-1. However, even these costs are relatively small when compared to in-hospital physician costs.

9.3.2. The Costs of Specific Services in Pre and Posthospital Care

In addition to dividing up the costs of pre and posthospital care according to whether or not the cases have any such utilization, a clearer picture of treatment during these periods will emerge if more detailed service breakdowns are provided for selected DRGs. Table 9-3 provides such a breakdown for a surgical DRG, transurethral prostatectomy (or TURP, DRG 336). For comparison, some related costs are included: total inpatient physician costs, total physician costs (including pre and post care), and total episode costs (physician plus hospital costs). Because the sample is based on hospital admissions, 100 percent of the cases have nonzero values for these three variables.

The pattern for the detailed utilization components is the same prior to hospitalization across states as the pattern for DRGs presented in Table 9-2 -- namely, a greater percentage of cases utilizing a given service

TABLE 9-3

SERVICE COMPONENTS OF PRE AND POSTHOSPITAL COSTS: TRANSURETHRAL PROSTATECTOMY (DRG 336)

	New Jersey		North Carolina	
	% of Cases	Average Costs	% of Cases	Average Costs
Prehospitalization Costs	44.4%	$ 66	56.8	$ 49
Office visits to attending MD	15.0	26	17.1	18
Office visits to other MD	16.6	22	23.3	20
Home visits	0.7	23	0.1	20
Nursing home visits	0.4	28	0.5	19
OPD-ER visits	4.7	53	10.4	30
Surgical procedures	6.6	60	6.6	54
Lab tests	18.8	24	33.0	11
X-Rays	11.5	78	12.9	64
Other tests	5.7	27	8.2	17
Inpatient Physician Costs	100.0%	$1,648	100.0%	$1,220
Posthospitalization Costs	18.3%	$ 81	16.3%	$ 69
Office visits to attending MD	1.8	21	1.3	16
Office visits to other MD	6.3	21	3.0	19
Home visits	0.5	30	0.3	20
Nursing home visits	1.2	40	1.0	35
OPD-ER visits	2.0	58	2.2	27
Surgical procedures	1.0	71	0.9	94
Lab tests	6.7	31	8.4	22
X-Rays	4.1	161	2.6	244
Other tests	3.4	59	2.1	25
Total Physician Costs	100.0%	$1,725	100.0%	$1,258
Total Physician and Hospital Costs	100.0%	$4,327	100.0%	$3,414

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

in North Carolina, but a higher average cost in New Jersey. The most important components are office visits to the attending physician and to other physicians, and lab tests and x-rays. Post operative costs occur with a lower frequency, and are generally similar across states. (The greater average cost for the small percentages of cases with x-rays in North Carolina is largely the result of a few high cost cases.)

Total physician costs, including services both within and outside the hospital during the time window analyzed, are about a third higher in New Jersey, and the total costs of the episode (including all hospital costs) are about a quarter higher. In both states prehospital costs are about 2 percent of total physician costs (including pre and post care) and less than 1 percent of total episode costs (including all hospital care).

Table 9-2 indicated a substantial difference between posthospital utilization and charge behavior for New Jersey versus North Carolina for DRG 14, specific cerebrovascular disease. Table 9-4 allow us to explore this difference. The table indicates that it is largely due to both greater utilization and higher fees for x-rays and, to a lesser degree, for other tests. The average costs are based on relatively large samples (1,700 cases with X-rays in New Jersey, 300 in North Carolina), and therefore are not the result of one or two expensive cases. The data set does not allow us to ascertain directly what these specific x-ray procedures are, but it is most likely that a large proportion of these costs represent follow-up CT scans. There is evidently a substantial difference between New Jersey and North Carolina in what is considered appropriate medical practice during the posthospital period for this DRG. More detailed clinical analysis would be required to determine whether proper treatment requires the level of x-ray utilization found in New Jersey.

The large disparity between the two states for this DRG carries over to both total physician costs and total episode costs, which are 86 percent and 58 percent higher respectively in New Jersey than in North Carolina. However, the comparisons for TURPs are more representative of the other DRGs that were analyzed in detail than are the comparisons for specific cerebrovascular disorders.

TABLE 9-4

SERVICE COMPONENTS OF PRE AND POSTHOSPITAL COSTS: SPECIFIC CEREBROVASCULAR DISEASE (DRG 14)

	New Jersey		North Carolina	
	% of Cases	Average Costs	% of Cases	Average Costs
Prehospitalization Costs	39.0%	$ 53	55.8%	$ 43
Office visits to attending MD	10.7	21	11.9	18
Office visits to other MD	5.1	21	5.8	18
Home visits	3.3	26	1.6	23
Nursing home visits	2.8	25	2.2	23
OPD-ER visits	9.3	42	30.0	28
Surgical procedures	8.9	68	9.0	75
Lab tests	7.3	37	10.5	26
X-Rays	9.7	67	6.6	69
Other tests	8.3	29	14.8	23
Inpatient Physician Costs	100.0%	$ 764	100.0%	$ 418
Posthospitalization Costs	41.1%	$ 180	28.2	$ 66
Office visits to attending MD	5.3	22	5.4	16
Office visits to other MD	3.0	23	2.7	28
Home visits	1.5	30	0.4	31
Nursing home visits	10.7	44	6.3	31
OPD-ER visits	3.6	116	5.7	26
Surgical procedures	0.5	108	0.6	115
Lab tests	10.3	70	9.4	44
X-Rays	20.0	229	4.5	151
Other tests	7.3	128	4.5	36
Total Physician Costs	100.0%	$ 859	100.0%	$ 460
Total Physician and Hospital Costs	100.0%	$4,699	100.0%	$2,976

Source Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

9.4 Physician Involvement in Pre and Post Costs and the Potential for Shifting

Visits by physicians during the pre and posthospital periods are the outcome of a complicated set of incentives and interrelationships, in addition to specific medical issues. In many cases, the attending physician during the hospital stay will not have been the patient's primary care physician prior to the stay. For surgical procedures, the primary care physician will usally have referred the patient to a surgeon. For medical treatment the primary care physician may have referred the patient to a specialist. In either situation, there is:

- a period prior to hospitalization when treatment by the two physicians may overlap;
- a period during the hospital stay when the primary care physician may visit the patient while the patient is under the care of the attending physician; and
- a period after hospitalization when the primary care physician will most likely resume his role with the patient, although the patient may continue to see the attending physician for a specific condition.

The interactions between the physicians during these periods may be substantially different under the current reimbursement system as opposed to a physician DRG system.

Interactions Under the Current Reimbursement System: Where the attending physician is different from the patient's primary care physician prior to hospitalization, the number of visits made by each and the costs involved depend on a number of factors. If the primary care physician places a high value on insuring continuity of care and is not under great time demands from the rest of his practice, then the primary care physician may make frequent visits before, during, and after the hospital stay.

If the attending physician is interested in "capturing" the patient for his own practice, then his posthospital visits may be more frequent. Alternatively, the attending physician may prefer to treat only severe cases in a specialized area, either by personal preference or because these cases allow him to utilize his technical skills to a greater degree and obtain greater compensation for his time. As noted earlier, there is also currently

some amount of packaging for surgical procedures that will make it less financially rewarding for surgeons to make posthospital visits with the patient.

Interactions Under a Physician DRG Payment System: If a physician DPG system covers only the hospital stay, a substantially different incentive structure would be present. The attending physician would most likely be the residual claimant on the DRG payment, and this would create an incentive for the physician to shift activity out of the hospital stay, thereby enlarging his residual payment. If the shifted services are provided by the attending physician, then he may be able to obtain additional payment. However, it is important to recognize that by reducing claims on the fixed DRG payment, the attending physician will benefit from shifting even if the shifted services are performed outside the hospital by some other physician. Depending on the preferences and alternative uses of time of the physicians involved, the attending physician might prefer to shift services to another physician (such as the primary care physician or a consultant) outside the hospital stay.

The net result may be one that satisfies all the physicians involved. The attending physician has an incentive to shift some services outside the hospital, in order to increase his residual payment. In particular, the attending physician may want to restrain the costs of in-hospital visits made by the primary care physician. If the patient is referred back to the primary care physician for some of these shifted services, then the primary care physician will not lose visits and income, and will continue to be willing to refer patients to the attending physician.

In other words, the timing of visits becomes crucial under a physician DRG system. Different roles are assigned to the various physicians in terms of their claims on the fixed DRG payment, so it would not be unreasonable to expect a shift from the current pattern of visits in response to the new incentive structure. However, an increase in the interval that is covered by the DRG payment to include a pre and posthospital interval would limit the ability of physicians to respond to these changed incentives.

In the following section we provide a baseline perspective on current patterns of out-of-hospital visits.

9.4.1 Current Patterns of Pre and Posthospitalization Physician Visits

In this section we examine only those cases that have a nonzero level of pre or posthospital costs, in order to determine the extent of physician involvement during the analysis week in producing such costs. These data are presented in Table 9-5. For example, when one looks at only those cases that have some costs in the one week interval prior to admission for specific cerebrovascular disease (DRG 14), we find that 70 percent of these cases had visits during this period with some physician, and 38 percent had visits with the attending physician. Visits are counted at any site: office, home, nursing home, and OPD-ER.

The vast majority of cases with prehospital costs include one or more physician visits, although the percentage is higher in North Carolina than in New Jersey. Those cases with costs but without any visits most likely result from labwork, x-rays, or other tests that were billed during the prehospital week but ordered in a visit prior to it.

During the prehospital period, a smaller proportion of cases with charges had visits specifically with the attending physician. The difference between these two percentages may be accounted for by visits with primary care physicians who referred to another physician for the hospital spell, consultations, and possibly by the absence of costs for visits by the attending physician for surgical procedures.

During the posthospital period, physician visits are generally less frequent. North Carolina has higher percentages than New Jersey for medical DRGs and lower percentages for surgical DRGs. This last result is consistent with the greater packaging observed in Chapter 5 for surgeons in North Carolina.

9.5 Substitution in the Provision of Hospital and Out-of-Hospital Care

The potential for cost shifting in a physician DRG payment system is largely limited by the feasibility of substitution of out-of hospital care for in-hospital care. In the introduction to this chapter we briefly discussed some factors that affect the possibility of substitution. In this section we

TABLE 9-5

PHYSICIAN VISITS WITH PATIENTS BEFORE OR AFTER HOSPITALIZATION (As Percentage of Cases With Costs)

DRG		New Jersey				North Carolina			
		Pre		Post		Pre		Post	
		Cases With: Any Physician Visit	Cases With: Attending Physician Visit	Cases With: Any Physician Visit	Cases With: Attending Physician Visit	Cases With: Any Physician Visit	Cases With: Attending Physician Visit	Cases With: Any Physician Visit	Cases With: Attending Physician Visit
14	Specific Cerebrovasc Dis exc TIA	70%	38%	50%	23%	83%	30%	68%	27%
15	Transient Ischemic Attacks	76	47	52	34	83	36	71	41
16	Nonspecific Cerebrovasc Dis w/ CC	73	47	54	26	--	--	--	--
17	Nonspecific Cerebrovasc Dis w/o CC	75	51	59	29	80	39	68	28
39	Lens Procedures	59	23	87	23	47	20	38	3
89	Pneumonia Age 70+ &/or CC	65	42	71	50	80	37	78	50
90	Pneumonia Age 18-69 w/o CC	66	45	58	46	81	40	39	28
115	Perm Pacemaker Implant w/AMI or CHF	78	13	58	8	80	9	70	13
116	Perm Pacemaker Implant w/o AMI or CHF	76	11	63	11	78	17	60	15
127	Heart Failure & Shock	74	48	67	45	82	38	77	45
132	Atherosclerosis Age 70+ &/or CC	76	48	61	36	82	39	75	[illegible]
133	Atherosclerosis Age 70 w/o CC	75	52	61	40	79	34	74	42
140	Angina Pectoris	74	48	70	50	79	37	81	52
148	Major Bowel Procs Age 70+ &/or CC	66	13	58	9	73	22	55	11
149	Major Bowel Procs Age 70 w/o CC	64	27	68	25	69	28	48	11
182	Gastroenteritis & Misc. Dis Age 70 &/or CC	76	52	67	41	83	50	71	43
183	Gastroenteritis & Misc. Dis Age 18-69 w/o CC	75	53	59	37	83	51	71	43
195	Cholecystectomy w/CDE Age 70+ &/or CC	73	17	60	18	84	20	44	9
196	Cholecystectomy w/CDE Age 70 w/o CC	69	16	33	12	78	32	45	10
197	Cholecystectomy w/o CDE Age 70+ &/or CC	73	19	74	20	82	25	60	19
198	Cholecystectomy w/o CDE Age 70 w/o CC	71	27	70	22	80	33	60	16
209	Major Joint Procedures	65	14	67	7	69	18	39	3
294	Diabetes Age 36+	77	56	62	41	80	50	69	47
336	Transurethral Prostatectomy Age 70+ &/or CC	73	37	63	17	80	54	47	11
337	Transurethral Prostatectomy Age 70 w/o CC	71	40	58	16	80	53	34	7

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

analyze whether the variation in pre and post utilization in our sample provides some indication of substitution of pre or posthospital care for treatment supplied during the hospital stay.

One basic approach is to compare the levels of in-hospital costs for those cases with and without pre and/or posthospital care. If substitution is an important reason for higher levels of out-of-hospital costs, then we would expect in-hospital costs to be lower for the group with out-of-hospital utilization. In addition to comparing total hospital costs, we can also compare costs for specific categories, such as in-hospital physician costs and the costs of ancillaries (including the hospital component). Seven DRGs were chosen for more detailed analysis of this simple hypothesis in each state. Some of these provided support for the hypothesis while others did not.

An example of a DRG where comparisons did not support the hypotheses is presented in Table 9-6, for lens procedures (DRG 39). The table shows, for example, that in New Jersey 44.1 percent of the cases had some pre or posthospital costs, while 55.9 percent had zero out-of-hospital costs. Of those cases with some out-of-hospital costs, 85.8 percent had some costs prior to hospitalization, with an average cost for these cases of $62. Because the data are for persons with a hospital stay, 100 percent of the sample have some level of hospital costs, although a very small percentage have zero costs specifically identified as being for lab, X rays, or other tests in the hospital.

In both states, total hospital costs are slightly higher for those cases with pre or post utilization. Furthermore, major components of this total, such as physician costs, costs of ancillaries (including the hospital component), and length of stay are also higher for those cases with some pre or post costs.

The results for lens procedures indicate that the variation in pre and post utilization patterns is not evidence of a substitution for hospital care. Cases with such utilization may instead represent more complicated cases. Or the practice patterns of those physicians who utilize pre or post care may also involve more intensive use of resources during a lengthier hospital stay.

An example of a DRG where there _is_ some evidence of substitution is angina pectoris (DRG 140) in North Carolina, presented in Table 9-7 along with the data for New Jersey. In North Carolina, we find that for patients who receive

TABLE 9-6

COMPARISON OF COSTS FOR CASES WITH AND WITHOUT OUT OF HOSPITAL COSTS - LENS PROCEDURES (DRG 39)

	New Jersey				North Carolina			
	Cases With Pre or Post Costs (44.1%)		Cases w/o Pre or Post Costs (55.9%)		Cases With Pre or Post Costs (42.7%)		Cases w/o Pre or Post Costs (57.3%)	
	% of Cases	Average Cost	% of Cases	Average Cost	% of Cases	Average Cost	% of Cases	Average Cost
Prehospital Costs	85.8%	$62	--	--	81.2%	$85	--	--
Physician Visits	49.7	23	--	--	36.2	20	--	--
OPD-ER Costs	2.2	59	--	--	2.0	35	--	--
Surgical Procedures	3.2	61	--	--	1.3	54	--	--
Lab, X-Ray, Other Tests	52.4	73	--	--	61.8	98	--	--
Hospital Data								
Total Hospital Costs	100.0%	$3,156	100.0%	$2,988	100.0%	$2,416	100.0%	$2,278
Physician Costs	100.0	1,897	100.0	1,801	100.0	1,331	100.0	1,265
Lab, X-Ray, Other Tests	99.4	122	99.7	118	98.6	22	98.1	21
Hospital Length of Stay	100.0	4.3 days	100.0	4.0 days	100.0	3.7 days	100.0	3.7 days
Posthospital Costs	25.7%	$ 65	--	--	27.9%	$ 73	--	--
Physician Visits	18.0	25	--	--	9.2	17	--	--
OPD-ER Costs	2.3	85	--	--	1.7	26	--	--
Surgical Procedures	1.1	250	--	--	0.6	237	--	--
Lab, X-Ray, Other Tests	11.8	63	--	--				

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

TABLE 9-7

COMPARISON OF COSTS FOR CASES WITH AND WITHOUT OUT OF HOSPITAL COSTS - ANGINA PECTORIS (#140)

	New Jersey				North Carolina			
	Cases With Pre or Post Costs (62.2%)		Cases w/o Pre or Post Costs (37.8%)		Cases With Pre or Post Costs (75.1%)		Cases w/o Pre or Post Costs (24.9%)	
	% of Cases	Average Cost	% of Cases	Average Cost	% of Cases	Average Cost	% of Cases	Average Cost
Prehospital Costs	78.1%	$50	--	--	87.4%	$40	--	--
Physician Visits	49.0	22	--	--	38.3	18	--	--
OPD-ER Charges	13.2	42	--	--	36.4	26	--	--
Surgical Procedures	1.4	86	--	--	1.0	34	--	--
Lab, X-Ray, Other Tests	53.5	40	--	--	53.6	33	--	--
Hospital Data								
Total Hospital Costs	100.0%	$2,569	100.0%	$2,531	100.0%	$1,991	100.0%	$2,171
Part B Charges	100.0	477	100.0	456	100.0	18	100.0	370
Lab, X-Ray, Other Tests	100.0	454	100.0	435	100.0	79	99.8	84
Hospital Length of Stay	100.0	9.9 days	100.0	9.7 days	100.0	7.8 days	100.0	7.5 days
Posthospital Costs	48.7%	$ 77	--	--	39.0%	$ 44	--	--
Physician Visits	33.0	22	--	--	25.6	17	--	--
OPD-ER Charges	4.6	74	--	--	7.1	26	--	--
Surgical Procedures	1.0	70	--	--	0.6	145	--	--
Lab, X-Ray, Other Tests	27.9	93	--	--	19.4	51		
Percent of All Cases	62.2%		37.8%		75.1%		24.9%	

Source: Medicare Part A and Part B claims from New Jersey and North Carolina, 1982.

care resulting in pre or post costs, $5 less is spent on ancillaries within the hospital, $52 dollars less on in-hospital physician costs, and $180 less on the total hospital stay, although length of stay is slightly longer. By comparison, $35 on average (87.4% x $40) was spent on prehospital costs and $17 (39.0% x $44) on posthospital costs.

The DRG for angina includes a wide range of illness severity and decisions regarding hospitalization and length of stay may vary greatly among physicians. These decisions may include a subjective evaluation of the psychological benefits the patient may receive from hospitalization. Such factors are probably reflected in the high coefficient of variation for this DRG in North Carolina (1.59 for inpatient physician costs only), and the moderate decline in the CV (to 1.46) when out-of-hospital physician costs are included. Some degree of substitution between hospital and out-of-hospital services is indicated here and in some other DRGs that were analyzed.

Another simple type of analysis was performed with the same set of DRGs to analyze further whether there is any evidence of substitution. Correlations were calculated between total in-hospital costs and its components, on the one hand, and total pre and posthospital costs and some of its components, on the other. In some cases (mostly medical DRGs) there were significant negative correlations between total hospital costs and either total prehospital costs or the costs of prehospital physician visits. With the same frequency, but not necessarily for the same DRGs, significant relationships were found between length of hospital stay and measures of prehospital costs. For a few DRGs there was even a significant negative correlation between inpatient physician costs and in-hospital ancillary costs and measures of pre or post costs. However, in other cases the correlations described above were either insignificant or positive.

In summary, the results for both the comparisons of cases grouped by the presence or absence of out-of-hospital charges, and the analyses of the simple correlations between in-hospital and out-of-hospital costs are inconclusive. The potential for substitution may vary from DRG to DRG. There may be a larger pattern such as, for example, a greater potential for substitution in medical DRGs than in surgical ones. Further more sophisticated analysis may resolve these ambiguities, but for the present we can only say that there is weak partial support for the hypothesis that some of the current variation in the costs of cases represents the substitution of pre or posthospital services for in-hospital care.

9.6 Summary and Conclusions

Pre and posthospital costs and utilization were analyzed for the week before and the week after hospitalization. Such costs occur more frequently before than after the hospital stay, but in either case the costs are small when compared to the total physician bill in the hospital. This result indicates that the added costs would be small if physician DRG packages were expanded to include the one week intervals before and after hospitalization. Such an extension would limit undesired shifting that might occur as a result of incentives created by a physician DRG payment system. Furthermore, adding pre and post costs to physician costs in the hospital has little impact on the coefficient of variation for most DRGs.

The possibility for shifting depends in part on the feasibility of substituting out-of-hospital care for in-hospital services. Such substitution has been found in some other studies of health care delivery. However, the simple analyses of Medicare claims data that were presented here provide only partial support for the hypothesis that some of the variation in hospital and out-of-hospital costs for an illness represents the substitution of services between the two locations.

The possibility of shifting also depends upon the relationships among the physicians who treat the patient. As the residual claimant to the DRG payment, the attending physician may have an incentive to move the provision of some services out of the hospital even if the services are provided by other physicians. The degree to which services might be transferred to other physicians will depend in part on the preferences of the attending physician and the value of alternative uses of his time. In this chapter we found that physician visits occur in only a portion of those cases where there are services provided (as indicated by costs) during the pre and posthospital intervals, and visits by the attending physician occur in an even smaller portion of such cases.

Finally, the data presented here can serve as a baseline against which future utilization patterns can be measured. This baseline would be useful for gauging other possible unforeseen responses to physician DRGs in addition to shifting.

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APPENDIX A

MEAN PAYMENT LEVELS FOR HOSPITAL AND PHYSICIAN DRGs

DRG	TITLE	NEW JERSEY PART A MEAN	NEW JERSEY PART A CV	NEW JERSEY PART B MEAN	NEW JERSEY PART B CV	NORTH CAROLINA PART A MEAN	NORTH CAROLINA PART A CV	NORTH CAROLINA PART B MEAN	NORTH CAROLINA PART B CV
1	CRANIOTOMY AGE>17 EXCEPT TRAUMA	8356	0.79	3999	0.35	7544	1.03	2475	0.38
2	CRANIOTOMY FOR TRAUMA AGE>17	8587	0.96	3876	0.37	7524	1.26	2107	0.32
3	CRANIOTOMY AGE<18	9046*	0.71	3784*	0.39	0*	0.00	0*	0.00
4	SPINAL PROCEDURES	6978	0.73	3545	0.33	8362	1.08	2178	0.41
5	EXTRACRANIAL VASCULAR PROCEDURES	4139	0.87	3258	0.31	4150	0.69	2304	0.31
6	CARPAL TUNNEL RELEASE	1050	0.77	825	0.38	904	0.76	605	0.35
7	OTH NERV SYST PROCS AGE>69 +/OR CC	3249	1.35	1415	0.82	2380	1.41	904	0.52
8	OTH NERV SYST PROCS AGE<70 W/O CC	2260	1.17	1161	0.58	2035	1.12	841	0.66
9	SPINAL DISORDERS+INJURIES	4637	1.22	834	0.87	2613	1.23	415	0.86
10	NERVOUS SYSTEM NEOPLASMS AGE>69 AND/OR CC	3521	1.00	854	0.79	3342	2.17	491	1.24
11	NERVOUS SYSTEM NEOPLASMS AGE<70 W/O CC	3113	0.98	757	0.78	2760	1.53	475	0.84
12	DEGENERATIVE NERVOUS SYSTEM DISORDERS	3162	1.06	699	0.72	2407	1.13	412	0.97
13	MULTIPLE SCLEROSIS+CEREBELLAR ATAXIA	3022	1.04	600	0.74	2388	0.86	486	1.28
14	SPECIFIC CEREBROVASCULAR DISORDERS WITH CC	3832	1.01	763	0.74	2524	1.07	418	0.90
15	TRANSIENT ISCHEMIC ATTACKS	1947	0.90	575	0.69	1377	1.10	343	1.10
16	NONSPECIFIC CEREBROVASCULAR DISORDERS WITH CC	3109	0.85	737	0.70	0*	0.00	0*	0.00
17	NONSPECIFIC CEREBROVASCULAR DISORDERS W/O CC	2132	0.84	592	0.76	1830	1.06	370	1.03
18	CRANIAL+PERIPH NERVE DISORDERS AGE>69 +/OR CC	2351	1.00	705	0.74	2051	1.46	471	0.99
19	CRANIAL+PERIPH NERVE DISORDERS AGE<70 W/O CC	2002	0.87	634	0.59	2239	2.50	471	0.96
20	NERVOUS SYSTEM INFECTION EXCEPT VIRAL MENING	3800	1.13	866	0.83	3193	1.58	493	1.26
21	VIRAL MENINGITIS	3938*	1.01	843*	0.65	1505	1.13	275	0.73
22	HYPERTENSIVE ENCEPHALOPATHY	2732	1.80	595	1.09	1606	0.85	259	0.78
23	NONTRAUMATIC STUPOR+COMA	4015	1.12	818	1.00	1510	1.27	328	1.02
24	SEIZURE+HEADACHE>69 AND/OR CC	2351	1.20	581	0.74	1613	1.37	313	0.89
25	SEIZURE+HEADACHE AGE 18-69 W/O CC	1752	0.82	508	0.69	1513	1.17	282	0.78
26	SEIZURE+HEADACHE AGE 0-17	2163	1.02	530	0.59	0*	0.00	0*	0.00
27	TRAUMATIC STUPOR+COMA, COMA>1 HR	5393	0.94	1059	0.70	4521*	1.49	584*	1.08
28	TRAUMATIC STUPOR+COMA<1 HR AGE>69 +/OR CC	3096	1.70	791	1.21	3403	2.21	465	1.21
29	TRAUMATIC STUPOR+COMA<1 HR AGE 18-69 W/O CC	2776	1.59	622	0.86	2828	1.80	407	0.84
30	TRAUMATIC STUPOR+COMA<1 HR AGE 0-17	2554*	0.78	713*	0.71	0*	0.00	0*	0.00
31	CONCUSSION AGE>69 AND/OR CC	1920	1.11	558	0.80	1439	2.16	280	1.16
32	CONCUSSION AGE 18-69 W/O CC	1354	0.82	482	0.69	861	0.70	222	0.67
33	CONCUSSION AGE 0-17	1869	1.31	490	0.95	0*	0.00	0*	0.00
34	OTHER DISORDERS OF NS AGE>69 AND/OR CC	3094	1.23	714	0.70	2182	1.27	495	1.14
35	OTHER DISORDERS OF NS AGE<70 W/OR CC	3112	1.35	809	1.13	2202	1.91	445	1.05
36	RETINAL PROCEDURES	1830	0.47	2246	0.26	2095	0.64	1503	0.36
37	ORBITAL PROCEDURES	1790	0.72	1217	0.56	1702	0.96	836	0.52
38	PRIMARY IRIS PROCEDURES	930	0.44	934	0.24	915*	1.01	594*	0.68
39	LENS PROCEDURES	1218	0.56	1842	0.26	1099	0.48	1293	0.21
40	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE>17	1020	1.56	1028	0.42	1005	0.75	762	0.46
41	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE 0-17	776*	0.14	773*	0.19	0*	0.00	0*	0.00
42	INTRAOCULAR PROCS EXCEPT RETINA, IRIS+LENS	1575	0.75	2021	0.46	1793	0.69	1311	0.49
43	HYPHEMA	1990*	0.79	505*	0.82	1076*	0.84	330*	0.70
44	ACUTE MAJOR EYE INFECTIONS	2504	0.91	557	0.78	1686	0.87	290	0.84
45	NEUROLOGICAL EYE DISORDERS	1443	0.62	599	0.54	1509	0.90	464	0.63
46	OTHER DISORDERS OF THE EYE AGE>17 WITH CC	2044	0.74	665	1.16	0*	0.00	0*	0.00
47	OTHER DISORDERS OF THE EYE AGE>17 W/O CC	1768	0.99	670	0.86	1685	2.29	370	1.29
48	OTHER DISORDERS OF THE EYE AGE 0-17	2615*	1.09	612*	0.69	0*	0.00	0*	0.00
49	MAJOR HEAD+NECK PROCEDURES	5581	0.59	3007	0.48	5549	0.84	2058	0.48
50	SIALOADENECTOMY	0*	0.00	0*	0.00	1245*	0.27	1204*	0.50

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
51	SALIVARY GLAND PROCS EXCEPT SIALOADENECTOMY	1747	0.46	1389	0.41	952*	0.31	649*	0.44
52	CLEFT LIP+PALATE REPAIR	0*	0.00	0*	0.00	5029*	0.00	2062*	0.00
53	SINUS+MASTOID PROCEDURES AGE>17	1470	0.77	1331	0.37	1379	0.80	966	0.34
54	SINUS+MASTOID PROCEDURES AGE 0-17	645*	0.00	618*	0.00	2500*	1.41	1293*	0.40
55	MISCELLANEOUS EAR, NOSE+THROAT PROCEDURES	1229	1.62	1093	0.44	1032	0.76	994	0.42
56	RHINOPLASTY	1167	0.76	1292	0.47	994	0.67	721	0.25
57	OTH T+A PROCS AGE>17	1316*	0.60	556*	0.32	1840*	0.65	644*	0.52
59	TONSILLECTOMY +/OR ADENOIDECTOMY AGE>17	636*	0.00	310*	0.00	0*	0.00	0*	0.00
61	MYRINGOTOMY AGE>17	743*	0.46	419*	0.17	520*	0.18	237*	0.20
63	OTHER EAR, NOSE+THROAT O.R. PROCEDURES	3986	1.02	1615	0.60	3786	1.47	1266	0.61
64	EAR, NOSE+THROAT MALIGNANCY	2643	1.23	686	1.18	2526	1.08	546	1.19
65	DYSEQUILIBRIUM	1470	0.74	475	0.70	1059	0.76	246	0.73
66	EPISTAXIS	1343	1.07	395	1.00	1217	1.25	220	0.89
67	EPIGLOTTITIS	1032*	0.08	352*	0.46	990*	0.47	320*	0.55
68	OTITIS MEDIA+URI AGE>69 AND/OR CC	1923	0.93	477	1.04	1597	1.07	245	0.79
69	OTITIS MEDIA+URI AGE 18-65 W/O CC	1982	1.87	455	1.13	1265	0.88	240	1.43
70	OTITIS MEDIA+URI AGE 0-17	1599*	0.81	369*	1.09	0*	0.00	0*	0.00
71	LARYNGOTRACHEITIS	921*	0.36	283*	0.36	9862*	0.96	492*	0.83
72	NASAL TRAUMA+DEFORMITY	2440	2.50	640	1.05	1517	0.90	344	0.83
73	OTHER EAR, NOSE+THROAT DIAG. AGE>17	2169	1.49	665	0.70	1500	0.91	339	0.90
74	OTHER EAR, NOSE+THROAT DIAG. AGE 0-17	1917*	0.67	423*	0.46	0*	0.00	0*	0.00
75	MAJOR CHEST PROCEDURES	7596	1.00	3465	0.35	6367	0.88	1967	0.36
76	OR PROCS ON RESP SYS EXC MAJOR CHEST WITH CC	9074	1.23	2326	0.59	6849*	0.63	2498*	0.45
77	OR PROCS ON RESP SYS EXC MAJOR CHEST W/O CC	7243	1.29	1932	0.53	5598	1.13	1365	0.68
78	PULMONARY EMBOLISM	3519	0.81	747	0.74	3169	1.04	471	0.76
79	RESP INFEC+INFLAM AGE>69 AND/OR CC	5334	1.33	913	0.99	3472	1.49	487	1.40
80	RESP INFEC+INFLAM AGE 18-69 W/O CC	4614	1.01	865	0.89	2759	1.01	475	0.82
81	RESP INFEC+INFLAM AGE 0-17	5724	0.84	1029	0.94	0*	0.00	0*	0.00
82	RESPIRATORY NEOPLASMS	3065	1.03	790	0.84	2475	1.23	477	1.06
83	MAJOR CHEST TRAUMA AGE>69 AND/OR CC	2556	1.00	659	0.98	3107	1.71	392	1.11
84	MAJOR CHEST TRAUMA AGE<70 W/O CC	1964	0.88	492	0.91	1981*	0.82	422*	0.75
85	PLEURAL EFFUSION AGE>69 AND/OR CC	2878	0.87	802	0.73	2944	1.05	517	0.90
86	PLEURAL EFFUSION AGE<70 W/O CC	2775	0.93	840	0.75	2990	0.82	508	0.75
87	PULMONARY EDEMA+RESPIRATORY FAILURE	3948	1.10	674	0.90	3022	1.26	390	0.99
88	CHRONIC OBSTRUCTIVE PULMONARY DISEASE	3218	1.42	575	1.03	2242	1.19	307	0.84
89	SIMPLE PNEUMONIA+PLEURISY AGE>69 AND/OR CC	3296	1.02	604	0.88	2315	1.10	320	0.92
90	SIMPLE PNEUMONIA+PLEURISY AGE 18-69 W/O CC	2667	1.06	562	1.01	2178	1.23	311	0.98
91	SIMPLE PNEUMONIA+PLEURISY AGE 0-17	3214	1.04	547	0.81	0*	0.00	0*	0.00
92	INTERSTITIAL LUNG DISEASE AGE>69 AND/OR CC	3083	1.04	752	0.94	2814	1.18	417	0.76
93	INTERSTITIAL LUNG DISEASE AGE<70 W/O CC	2258	0.94	607	0.66	2874	1.07	608	1.21
94	PNEUMOTHORAX AGE>69 AND/OR CC	3627	1.03	873	0.71	2916	1.20	488	0.89
95	PNEUMOTHORAX AGE<70 W/O CC	1590	0.62	549	0.60	2307	0.77	445	0.54
96	BRONCHITIS+ASTHMA AGE>69 AND/OR CC	2364	0.99	450	0.78	1635	0.87	247	0.74
97	BRONCHITIS+ASTHMA AGE 18-69 W/O CC	2261	0.96	441	0.90	1640	0.92	239	0.76
98	BRONCHITIS+ASTHMA AGE 0-17	2250	0.83	424	0.76	0*	0.00	0*	0.00
99	RESP SIGNS+SXS AGE>69 +/OR CC	2776	1.44	623	0.84	1728	1.16	335	0.96
100	RESP SIGNS+SXS AGE<70 W/O CC	2322	1.00	572	0.89	1482	1.03	318	0.77
101	OTHER RESP DIAG AGE>69 AND/OR CC	2501	1.12	574	0.75	2406	2.35	377	1.31
102	OTHER RESP DIAG AGE<70	2601	1.39	656	1.12	2073	1.14	365	0.95
104	CARDIAC VALVE PROC W/ PUMP+CARDIAC CATH	3351	0.73	5201	0.72	3189*	0.38	4769*	0.11

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
105	CARDIAC VALVE PROC W/ PUMP+W/O CARDIAC CATH	0331	0.80	5630	0.47	4954	0.51	4530	0.28
106	CORONARY BYPASS WITH CARDIAC CATH	3919	0.52	7791	0.40	9694	0.37	5018	0.31
107	CORONARY BYPASS W/O CARDIAC CATH	0642	0.70	6885	0.30	1061	0.95	5282	0.20
108	CARDIOTHORACIC EXC VALVE+CABG WITH PUMP	7523*	0.65	5135*	0.47	7232*	0.78	4355*	0.43
109	CARDIOTHORACIC PROCEDURES W/O PUMP	9816*	0.73	3868*	0.45	8308	0.67	2170	0.53
110	MAJOR RECONSTRUCT VASC PROCS AGE>69 +/OR CC	7462	0.80	3909	0.36	7003	1.06	2873	0.35
111	MAJOR RECONSTRUCT VASC PROCS AGE<70 W/O CC	5631	0.59	3578	0.36	6007	0.79	2870	0.36
112	VASCULAR PROCEDURES EXCEPT MAJOR RECON	6318	1.01	3009	0.55	4838	0.89	1890	0.57
113	AMPUT FOR CIRC SYS DISORDERS EXC UP LIMB+TOE	7595	0.82	2154	0.67	4357	1.03	1151	0.43
114	UPPER LIMB+TOE AMPUT FOR CIRC SYS DISORDERS	6138	0.96	1534	0.99	3946	0.93	606	0.73
115	PERM CARDIAC PACEMAKER IMPLANT WITH AMI OR CHF	9354	0.51	2594	0.29	8241	0.51	1715	0.29
116	PERM CARDIAC PACEMAKER IMPLANT W/O AMI OR CHF	7186	0.43	2259	0.30	6693	0.50	1571	0.30
117	CARDIAC PACEM REPL+REVIS EXC PULSE GEN REPL ONLY	4401	0.68	1162	0.67	3309*	0.74	774*	0.41
118	CARDIAC PACEMAKER PULSE GENERATOR REPLACE ONLY	6593*	0.43	2096*	0.26	6072*	0.74	1308*	0.27
119	VEIN LIGATION+STRIPPING	2333	0.94	1143	0.45	1641	0.62	731	0.30
120	OTHER O.R. PROCEDURES ON THE CIRCULATORY SYSTEM	7864	1.11	2044	0.61	4696	0.96	1262	0.56
121	CIRC DISORDERS WITH AMI+CV COMPLICS, ALIVE	4208	0.56	763	0.71	0*	0.00	0*	0.00
122	CIRC DISORDERS WITH AMI W/O CV COMPLICS, ALIVE	3255	0.69	626	0.83	3380	0.85	479	0.79
123	CIRCULATORY DISORDERS WITH AMI, EXPIRED	3908	1.09	750	0.93	2737	1.32	388	1.15
124	CIRC DISORDERS EXC AMI, W/CARD CATH+COMPLEX DX	2862	1.07	1173	0.83	5642*	0.60	1371*	1.01
125	CIRC DISORDERS EXC AMI, CARD CATH W/O COMPLEX DX	2233	0.94	1103	1.15	3315	0.83	943	0.95
126	ACUTE+SUBACUTE ENDOCARDITIS	6032	0.69	1088	0.61	6342*	0.74	855*	0.74
127	HEART FAILURE+SHOCK	2871	0.97	573	0.84	2274	1.18	348	0.94
128	DEEP VEIN THROMBOPHLEBITIS	2406	0.74	535	0.83	1861	0.69	291	0.58
129	CARDIAC ARREST	5161	1.15	879	1.10	3008	1.26	359	0.97
130	PERIPH VASCULAR DISORDERS AGE>69 AND/OR CC	2514	1.19	657	1.13	1990	1.67	403	1.51
131	PERIPH VASCULAR DISORDERS AGE<70 W/O CC	2208	0.99	687	1.27	1850	1.23	437	1.51
132	ATHEROSCLEROSIS AGE>69 AND/OR CC	2578	1.44	544	0.78	2100	1.10	368	1.20
133	ATHEROSCLEROSIS AGE<70 W/O CC	2609	1.32	592	1.38	2045	1.11	431	1.38
134	HYPERTENSION	2094	1.00	523	0.82	1643	1.16	319	0.94
135	CARDIAC CONGENITAL+VALVE DIS AGE>69 +/OR CC	2781	1.20	619	1.26	2720	1.21	583	1.35
136	CARDIAC CONGENITAL+VALVE DIS AGE 18-69 W/O CC	3423	1.34	1146	1.57	2989	1.57	974	1.64
137	CARDIAC CONGENITAL+VALVE DIS AGE 0-17	2806*	0.86	575*	0.59	0*	0.00	0*	0.00
138	CARDIAC ARRHYTHM+CONDUCTION DIS AGE>69 +/OR CC	2421	0.89	552	0.82	2236	1.50	382	1.23
139	CARDIAC ARRHYTHMIA+CONDUCTION DIS AGE<70 W/O CC	2222	0.88	504	0.77	1942	1.44	360	1.30
140	ANGINA PECTORIS	2080	0.70	468	1.00	1710	0.91	331	1.59
141	SNYCOPE+COLLAPSE AGE>69 AND/OR CC	1969	0.92	528	0.73	1541	1.00	299	0.87
142	SYNCOPE+COLLAPSE AGE<70 W/O CC	1894	0.81	531	0.75	1499	0.94	317	0.82
143	CHEST PAIN	1887	0.69	452	0.70	1746	0.93	307	0.84
144	OTHER CIRCULATORY DIAGNOSES WITH CC	2815	0.84	611	0.74	0*	0.00	0*	0.00
145	OTHER CIRCULATORY DIAGNOSES W/O CC	2806	0.98	653	1.05	2256	1.34	442	1.43
146	RECTAL RESECTION AGE>69 AND/OR CC	6955	0.60	2889	0.30	6364	1.56	1922	0.34
147	RECTAL RESECTION AGE<70 W/O CC	5445	0.36	2612	0.24	5015*	0.41	1853*	0.27
148	MAJ SM+LGE BOWEL PROCS AGE>69 +/OR CC	7090	0.87	2555	0.40	5426	1.04	1673	0.41
149	MAJ SM+LGE BOWEL PROCS AGE<70 W/O CC	5833	0.71	2438	0.36	4679	0.81	1591	0.34
150	PERITONEAL ADHESIOLYSIS>69 AND/OR CC	5146	0.74	1766	0.36	4573	0.79	1282	0.41
151	PERITONEAL ADHESIOLYSIS<70 W/O CC	4292	0.60	1601	0.26	3833	0.85	1099	0.35
152	MINOR SM+LGE BOWEL PROCS AGE>69 +/OR CC	3745	0.65	1401	0.38	3146	0.73	1160	0.53
153	MINOR SM+LGE BOWEL PROCS AGE<70 W/O CC	4302	0.78	1728	0.87	2752*	0.56	884*	0.45
154	STOMACH, ESOPH+DUODENAL PROCS AGE>69 +/OR CC	8274	0.92	2705	0.44	6099	1.38	1566	0.51

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY -				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
155	STOMACH, ESOPH+DUODENAL PROCS AGE 18-69 W/O CC	6471	0.89	2594	0.52	4872	1.75	1497	0.48
156	STOMACH, ESOPH+DUODENAL PROCS AGE 0-17	6408*	2.52	3518*	0.63	0*	0.00	0*	0.00
157	ANAL PROCEDURES AGE>69 AND/OR CC	1867	1.65	988	0.49	1481	0.80	569	0.53
158	ANAL PROCEDURES AGE<70 W/O CC	1429	0.79	829	0.49	1428	0.94	541	0.56
159	HERNIA PROCS EXC ING+FEMORAL AGE>69 +/OR CC	2463	0.88	1304	0.40	1959	0.93	805	0.33
160	HERNIA PROCS EXC ING+FEMORAL AGE 18-69 W/O CC	2215	0.82	1185	0.43	2043	0.72	825	0.31
161	INGUINAL+FEMORAL HERNIA PROCS AGE>69 +/OR CC	1739	0.80	1022	0.38	1469	0.69	680	0.34
162	INGUINAL+FEMORAL HERNIA PROCS AGE 18-69 W/O CC	1420	0.57	939	0.33	1233	0.54	653	0.26
163	HERNIA PROCEDURES AGE 0-17	1946	0.60	1059	0.46	0*	0.00	0*	0.00
164	APPENDECTOMY W COMPLIC PRINC DX AGE>69 +/OR CC	4491	0.58	1324	0.44	2967	0.63	790	0.42
165	APPENDECTOMY W COMPLIC PRINC DX AGE<70 W/O CC	3966	0.70	1210	0.38	3604	1.64	889	0.87
166	APPENDECTOMY W/O COMPLIC PRINC DX AGE>69 +/OR CC	3506	0.61	1179	0.32	3493	2.52	808	0.49
167	APPENDECTOMY W/O COMPLIC PRINC DX AGE<70 W/O CC	2378	0.60	1014	0.27	1529	0.86	692	0.26
168	PROCEDURES ON THE MOUTH AGE>69 AND/OR CC	4374	1.08	2013	0.79	3960	1.41	1197	0.79
169	PROCEDURES ON THE MOUTH AGE<70 W/O CC	4046*	1.01	2137*	0.85	1656*	1.00	919*	0.69
170	OTHER DIGESTIVE SYSTEM PROCS AGE>69 +/OR CC	5981	0.82	1903	0.52	5417	0.98	1187	0.56
171	OTHER DIGESTIVE SYSTEM PROCS AGE<70 W/O CC	4986	0.82	1826	0.59	4463	0.89	1250	0.56
172	DIGESTIVE MALIGNANCY AGE>69 AND/OR CC	3097	1.22	791	0.99	2271	1.30	499	1.20
173	DIGESTIVE MALIGNANCY AGE<70 W/O CC	2713	1.09	762	0.95	2207	1.32	622	1.20
174	G.I. HEMORRHAGE AGE>69 AND/OR CC	2617	0.94	734	0.82	2013	1.24	431	1.00
175	G.I. HEMORRHAGE AGE<70 W/O CC	2300	1.00	722	0.78	1783	1.09	422	0.85
176	COMPLICATED PEPTIC ULCER	2456	0.96	801	0.78	2588	2.78	650	1.32
177	UNCOMPLICATED PEPTIC ULCER>69 AND/OR CC	2035	0.75	671	0.64	1577	0.82	402	0.73
178	UNCOMPLICATED PEPTIC ULCER <70 W/O CC	1838	0.81	627	0.76	1307	0.69	363	0.80
179	INFLAMMATORY BOWEL DISEASE	3048	1.31	796	0.77	2351	1.11	540	0.92
180	G.I. OBSTRUCTION AGE>69 AND/OR CC	2326	1.10	597	0.90	1679	1.15	356	1.03
181	G.I. OBSTRUCTION AGE<70 W/O CC	1797	0.93	530	0.89	1546	1.22	312	0.95
182	MISC DIGESTIVE DIS AGE>69 +/OR CC	1986	1.10	588	0.81	1369	1.12	330	0.94
183	MISC DIGESTIVE DIS AGE 18-69 W/O CC	1747	0.88	573	0.82	1256	0.96	333	0.92
184	MISC DIGESTIVE DIS AGE 0-17	1953	0.80	546	0.70	462*	0.00	285*	0.00
185	DENTAL+ORAL DIS EXC EXTRAC+RESTOR AGE>17	2413	1.13	603	1.08	1811	1.29	343	1.08
186	DENTAL+ORAL DIS. EXC. EXTRAC+RESTOR, AGE 0-17	2527*	0.32	398*	0.48	0*	0.00	0*	0.00
187	DENTAL EXTRACTIONS+RESTORATIONS	1160	0.60	219	0.72	1296	1.69	176	0.79
188	OTHER DIGESTIVE SYSTEM DX AGE>69 +/OR CC	2174	1.31	698	0.82	1672	1.30	440	0.89
189	OTHER DIGESTIVE SYSTEM DX AGE 18-69 W/O CC	1912	1.13	718	0.78	1512	1.54	419	0.93
190	OTHER DIGESTIVE SYSTEM DIAGNOSES AGE 0-17	2428	1.41	650	0.75	3326*	0.57	519*	0.79
191	MAJOR PANCREAS, LIVER+SHUNT PROCEDURES	2398	0.55	4221	0.30	8496	0.95	2266	0.38
192	MINOR PANCREAS, LIVER+SHUNT PROCEDURES	2198*	0.29	3087*	0.03	9320*	0.55	1737*	0.12
193	BILIARY TRACT PROC EXC TOT CHOLEC AGE>69 +/OR CC	6622	0.59	2618	0.35	5740	0.96	1795	0.40
194	BILIARY TRACT PROC EXC TOT CHOLEC AGE<70 W/O CC	6933	0.67	2420	0.38	3837	0.53	1547	0.33
195	TOTAL CHOLECYST W C.D.E. AGE>69 +/OR CC	5445	0.76	2200	0.31	4479	1.10	1493	0.30
196	TOTAL CHOLECYST W C.D.E. AGE<70 W/O CC	4498	0.79	1980	0.30	3360	0.73	1430	0.28
197	TOTAL CHOLECYST W/O C.D.E. AGE>69 +/OR CC	4139	0.96	1855	0.38	3258	0.80	1246	0.30
198	TOTAL CHOLECYST W/O C.D.E. AGE<70 W/O CC	3018	0.65	1631	0.32	2643	0.66	1182	0.26
199	HEPATOBILIARY DIAG PROC FOR MALIGNANCY	5406	0.68	1952	0.54	5191*	0.71	1308*	0.36
200	HEPATOBILIARY DIAG PROC FOR NON-MALIGNANCY	4444	1.01	1553	0.75	4108	0.73	1160	0.31
201	OTHER HEPATOBILIARY OR PANCREAS O.R. PROCEDURES	4475*	0.50	2529*	0.39	5026*	0.79	1424*	0.29
202	CIRRHOSIS+ALCOHOLIC HEPATITIS	3039	0.91	694	0.77	2703	1.62	480	1.17
203	MALIGNANCY OF HEPATOBILIARY SYSTEM OR PANCREAS	2915	1.00	684	0.88	2532	1.20	475	1.03
204	DISORDERS OF PANCREAS EXCEPT MALIGNANCY	2369	1.02	635	0.95	2018	1.13	403	0.91

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

DRG	TITLE	NEW JERSEY - PART A MEAN	PART A CV	PART B MEAN	PART B CV	NORTH CAROLINA PART A MEAN	PART A CV	PART B MEAN	PART B CV
205	LIVER DIS EXC MALIG CIRR ALC HEPA AGE>69 OR CC	3109	1.09	748	0.87	2575	1.20	456	0.91
206	LIVER DIS EXC MALIG CIRR ALC HEPA AGE<70 W/O CC	2692	1.10	704	1.13	2120	1.07	415	0.69
207	DISORDERS OF THE BILIARY TRACT AGE>69 AND/OR CC	2259	0.94	641	0.99	1724	1.19	431	1.11
208	DISORDERS OF THE BILIARY TRACT AGE<70 W/O CC	1862	0.82	604	0.90	1477	0.87	412	1.05
209	MAJOR JOINT PROCEDURES	6023	0.57	2842	0.33	5801	0.52	2576	0.23
210	HIP+FEMUR PROCS EXC MAJ JOINT AGE>69 +/OR CC	5448	0.72	2237	0.29	4181	0.65	1356	0.23
211	HIP+FEMUR PROCS EXC MAJ JOINT AGE 18-69 W/O CC	4896	0.65	2118	0.32	4339	0.67	1359	0.21
212	HIP+FEMUR PROCS EXC MAJ JOINT AGE 0-17	4992	0.59	2124	0.31	0*	0.00	0*	0.00
213	AMPUTATIONS FOR MUSCULOSKELETAL DISORDERS	5822	1.10	1573	0.56	4154	1.02	1168	0.69
214	BACK+NECK PROCEDURES AGE>69 AND/OR CC	6009	0.72	3143	0.34	4362	0.72	1839	0.29
215	BACK+NECK PROCEDURES AGE<70 W/O CC	4376	0.50	2772	0.32	4078	0.77	1821	0.26
216	BIOPSIES OF MUSCULOSK SYSTEM+CONN TISSUE	4916	0.79	1511	0.63	2412*	0.93	596*	0.47
217	WOUND DEBRID+SKIN GRAFT EXC HAND FOR MUSC DIS	4239*	0.55	1272*	0.51	3866*	1.16	722*	0.67
218	LOW EXT+HUMER PROC EXC HIP FOOT FEMUR AGE>69 OR CC	3829	1.07	1573	0.56	3220	0.87	1060	0.31
219	LOW EXT+HUMER PROC EXC HIP FOOT FEMUR AGE 18-69	3117	0.83	1419	0.47	3115	0.58	1207	0.40
220	LOW EXT+HUMER PROC EXC HIP FOOT FEMUR AGE 0-17	3454*	0.46	1587*	0.29	0*	0.00	0*	0.00
221	KNEE PROCS AGE>69 +/OR CC	2592	1.43	1396	0.40	1483	0.58	933	0.22
222	KNEE PROCS AGE<70 W/O CC	2170	1.22	1315	0.37	1650	0.63	1001	0.23
223	UPPER EXTREM PROC EXC HUMERUS+HAND AGE>69 +/OR CC	2539	1.02	1276	0.46	3443	2.73	1048	0.59
224	UPPER EXTREM PROC EXC HUMERUS+HAND AGE<70 W/O CC	2317	1.03	1233	0.46	2445	0.77	1124	0.43
225	FOOT PROCEDURES	2185	0.97	997	0.50	1631	0.84	765	0.52
226	SOFT TISSUE PROCS AGE>69 +/OR CC	2313	1.09	1000	0.59	2147*	0.85	688*	0.53
227	SOFT TISSUUE PROCS AGE<70 W/O CC	2231	2.05	889	0.69	2231	1.14	659	0.56
228	GANGLION (HAND) PROCEDURES	839*	0.24	900*	0.24	1070*	0.00	275*	0.00
229	HAND PROCS EXC GANGLION	1454	0.94	1083	0.66	1493	0.83	870	0.54
230	LOCAL EXCI+REMOV INT FIX DEVICES OF HIP+FEMUR	2432	1.20	1013	0.73	2296*	0.78	720*	0.65
231	LOCAL EXCI+REMOV INT FIX DEVICES EXC HIP+FMR	2525	1.48	1004	0.86	1356*	0.60	773*	0.55
232	ARTHROSCOPY	1676	0.86	909	0.58	1447	0.72	938	0.44
233	OTH MUSCULOSK OR TISSUE PROCS AGE>69 +/OR CC	2880	0.88	1398	0.87	2600	0.70	986	0.54
234	OTH MUCULOSK OR TISSUE PROCS AGE<70 W/O CC	2714	0.90	1318	0.74	2411	1.24	844	0.54
235	FRACTURES OF FEMUR	4313	1.06	839	0.85	3272	1.37	571	0.76
236	FRACTURES OF HIP+PELVIS	3268	0.97	654	0.86	2196	0.94	423	0.92
237	SPRAINS,STRAINS + DISLOC OF HIP, PELVIS+THIGH	1922	0.81	496	0.59	1731	0.85	355	0.87
238	OSTEOMYELITIS	4236	0.81	737	0.66	3561	0.95	512	0.88
239	PATH FXS+MUSCULOSKELETAL MALIGNANCY	2861	0.96	683	0.78	2118	0.93	400	0.76
240	CONNECTIVE TISSUE DIS AGE>69 +/OR CC	2688	0.83	658	0.74	2135	1.27	430	1.00
241	CONNECTIVE TISSUE DIS AGE<70 W/O CC	2446	0.91	612	0.88	2054	1.12	410	1.05
242	SEPTIC ARTHRITIS	4022	0.85	888	0.89	3051*	1.10	555*	1.01
243	MEDICAL BACK PROBLEMS	2162	0.73	586	0.70	1507	1.13	328	0.83
244	BONE DIS&SEPTIC ARTHROPATHY AGE>69 +/OR CC	2268	0.89	556	0.79	1556	0.83	336	0.89
245	BONE DIS&SEPTIC ARTHROPATHY AGE<70 W/O CC	2015	0.83	551	0.77	1495	1.25	340	1.18
246	NON-SPECIFIC ARTHROPATHIES	2205	0.74	570	0.69	1430	0.70	275	0.61
247	SIGNS+SXS MUSCULOSK+CONN TISSUE	1835	0.96	493	0.61	1640	0.86	332	0.87
248	TENDONITIS, MYOSITIS+BURSITIS	1780	0.99	520	0.86	1409	0.85	340	0.87
249	AFTERCARE, MUCULOSKELETAL+CONN TISSUE DXS	2589	0.87	710	0.77	1663	0.74	448	2.22
250	FXS SPRNS ETC FOREARM HAND FOOT AGE>69 +/OR CC	1802	0.99	651	0.70	1513	0.89	338	0.76
251	FXS SPRNS ETC FOREARM HAND FOOT AGE 18-69 W/O CC	1408	1.19	608	1.05	1503	1.17	346	1.08
252	FXS SPRNS ETC FOREARM HAND FOOT AGE 0-17	1488	0.96	593	0.92	0*	0.00	0*	0.00
253	FXS SPRNS UP ARM L LEG EX FOOT AGE>69 +/OR CC	2121	1.05	578	0.71	1681	1.07	339	0.80
254	FXS SPRNS UP ARM L LEG EX FOOT AGE 18-69 W/O CC	1637	0.98	537	0.63	1836	1.59	391	1.16

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
255	FXS SPRNS UP ARM L LEG EX FOOT AGE 0-17	1791	0.91	526	0.57	0*	0.00	0*	0.00
256	OTH DX OF MUSCULOSK SYS+CONN TISSUE	2172	1.02	528	0.80	1788	1.24	334	0.78
257	TOTAL MASTECTOMY FOR MALIG AGE>69 +/OR CC	2931	0.58	1562	0.31	2391	0.61	1110	0.25
258	TOTAL MASTECTOMY FOR MALIG AGE<70 W/O CC	2441	0.42	1512	0.24	2357	0.51	1158	0.24
259	SUBTOTAL MASTECTOMY MALIG AGE>69 +/OR CC	2809	0.83	1153	0.55	3289*	0.41	1306*	0.02
260	SUBTOTAL MASTECTOMY MALIG AGE<70	1625*	0.63	847*	0.60	4557*	0.58	1711*	0.40
261	BREAST PROC FOR NORMALIG EXC BIOP+EXC	2183	0.54	1408	0.35	1637*	0.44	1047*	0.59
262	BREAST BIOP+LOC EXCI FOR NON-MALIG	1083	0.80	562	0.50	957	0.56	347	0.37
263	SKIN GRAFTS FOR SKIN ULCER/CELLUL AGE>69 +/OR C	5637	0.86	1444	0.73	4965*	0.63	1002*	0.54
264	SKIN GRAFTS FOR SKIN ULCER/CELLUL AGE<70 W/O CC	5119	0.83	1369	0.72	5929*	0.83	1260*	0.64
265	SKIN GRAFTS EXC FOR SKIN ULCER OR CELLUL W CC	2577	1.26	1150	0.68	1222*	0.53	803*	0.25
266	SKIN GRAFTS EXC FOR SKIN ULCER OR CELLUL W/O CC	2042	1.06	1043	0.58	2196	1.24	784	0.84
267	PERIANAL+PILONICAL PROCEDURES	2496*	2.02	766*	0.60	1244*	0.44	489*	0.39
268	SKIN SUBCUTANEOUS TISS+BREAST PLASTIC PROCS	1662	0.90	1039	0.53	1263*	1.06	811*	0.36
269	OTH SKIN SUBCUT TISS+BRST OR PROCS AGE>69 +/OR CC	3172	1.12	1122	0.78	2949	1.30	793	0.83
270	OTH SKIN SUBCUT TISS+BRST OR PROCS AGE<70 W/O CC	2775	1.35	1048	0.92	3314	1.64	736	0.84
271	SKIN ULCERS	3837	1.00	736	0.88	2439	1.33	471	1.11
272	MAJOR SKIN DISORDERS AGE>69 AND/OR CC	2768	1.36	594	0.87	1947	0.80	322	0.69
273	MAJOR SKIN DISORDERS AGE<70 W/O CC	2090	1.34	516	1.07	2004	1.05	347	0.88
274	MALIG BREAST DISORDERS AGE>69 +/OR CC	2981	1.12	666	0.79	2105	1.27	436	0.95
275	MALIG BREAST DISORDERS AGE<70 W/O CC	2943	0.96	729	0.91	1830	0.95	403	0.98
276	NON-MALIG BREAST DISORDERS	1905	1.44	610	0.89	2066	1.37	447	1.05
277	CELLULITIS AGE>69 +/OR CC	2841	0.96	576	0.87	1714	1.14	285	0.94
278	CELLULITIS AGE 18-69 W/O CC	2269	0.80	493	0.86	1676	0.77	277	0.74
279	CELLULITIS AGE 0-17	2619	0.66	524	0.53	0*	0.00	0*	0.00
280	TRAUMA TO SKIN SUBCUT TISS+BRST AGE>69 +/OR CC	2070	1.51	531	1.00	1358	1.30	257	1.16
281	TRAUMA SKIN SUBCUT TISS+BRST AGE18-69 W/O CC	1864	1.11	569	1.08	1596	1.69	333	2.48
282	TRAUMA SKIN SUBCUT TISS+BRST AGE 0-17	1650	0.82	449	0.64	0*	0.00	0*	0.00
283	MINOR SKIN DISORDERS AGE>69 AND/OR CC	2083	0.95	564	0.76	1728	1.07	355	0.97
284	MINOR SKIN DISORDERS AGE<70 W/O CC	1796	0.88	540	0.70	1584	1.71	328	1.02
285	AMPUTATIONS FOR ENDOC NUTR+METAB DISORDERS	8088	0.82	2012	0.62	4540	0.85	1093	0.48
286	ADRENAL+PITUITARY PROCEDURES	7911*	0.30	3900*	0.31	5590*	0.48	2193*	0.24
287	SKIN GRAFTS+WND DEBR FOR ENDOC,NUTR+META DIS	5680	0.73	1486	0.71	6311*	0.83	997*	0.58
288	OR PROCEDURES FOR OBESITY	8067*	0.52	2125*	0.30	3892*	0.40	1579*	0.26
289	PARATHYROID PROCEDURES	4853*	1.24	1903*	0.40	3533	0.92	1546	0.40
290	THYROID PROCEDURES	2549	1.30	1495	0.38	1625	0.90	966	0.30
291	THYROGLOSSAL PROCEDURES	1737*	0.79	889*	0.07	1058*	0.09	745*	0.13
292	OTH ENDOC,NUTR+METAB OR PROCS AGE>69 +/OR CC	7094	0.80	3001	0.56	4410	1.11	1653	0.57
293	OTH ENDOC,NUTR+METAB OR PROCS AGE<70 W/O CC	5739	0.71	2897	0.63	2512	0.84	1496	0.49
294	DIABETES AGE>36	2391	1.02	533	0.88	1691	1.07	303	0.93
295	DIABETES AGE 0-35	2200	0.96	460	0.77	1413	1.04	265	0.94
296	NUTR+MISC META DISORDERS AGE>69 +/OR CC	2761	1.05	571	0.85	1773	1.05	306	0.94
297	NUTR+MISC META DISORDERS AGE 18-69 W/O CC	2308	0.89	540	0.91	1755	1.33	310	1.15
298	NUTR+MISC META DISORDERS AGE 0-17	2125	0.71	465	0.65	0*	0.00	0*	0.00
299	INBORN ERRORS OF METABOLISM	2396	1.26	524	0.99	2666	1.32	438	0.86
300	ENDOCRINE DISORDERS AGE>69 AND/OR CC	2772	1.04	664	0.77	2312	1.02	465	1.04
301	ENDOCRINE DISORDERS AGE<70 W/O CC	2069	0.73	512	0.63	2019	1.16	461	1.32
302	KIDNEY TRANSPLANT	5751	0.62	5186	0.34	6244	0.45	3156	0.32
303	KIDNEY,URETER+MAJ BLADDER PROCS FOR NEOPLASM	5303	0.85	2759	0.47	7304	0.93	2328	0.37
304	KIDNEY,URETER+MAJ BLADDER PROCS NON-MALIG AGE>69 O	5004	0.65	2309	0.36	3845	0.78	1580	0.31

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

DRG	TITLE	NEW JERSEY PART A MEAN	NEW JERSEY PART A CV	NEW JERSEY PART B MEAN	NEW JERSEY PART B CV	NORTH CAROLINA PART A MEAN	NORTH CAROLINA PART A CV	NORTH CAROLINA PART B MEAN	NORTH CAROLINA PART B CV
305	KIDNEY,URETER+MAJ BLADDER PROCS NONMALG AGE<70 W/O	3954	0.62	2067	0.42	3800	0.98	1523	0.36
306	PROSTATECTOMY AGE>69 AND/OR CC	3494	0.82	1892	0.32	3332	1.57	1378	0.37
307	PROSTATECTOMY AGE<70 W/O CC	2956	0.85	1799	0.34	2191	0.82	1240	0.24
308	MINOR BLADDER PROCS AGE>69 AND/OR CC	4384	0.65	1867	0.45	4041*	0.71	1303*	0.44
309	MINOR BLADDER PROCS AGE<70 W/O CC	3818	0.65	1744	0.34	2035*	0.54	814*	0.27
310	TRANSURETHRAL PROCS AGE>69 +/OR CC	1806	1.22	957	0.66	3177*	1.09	1054*	0.82
311	TRANSURETHRAL PROCS AGE<70 W/O CC	1450	0.77	869	0.54	4423*	1.29	1119*	0.90
312	URETHRAL PROCS AGE>69 +/OR CC	1420	0.61	757	0.52	2815	1.35	689	0.60
313	URETHRAL PROCS AGE 18-69 W/O CC	1727	0.69	803	0.61	1544*	0.70	586*	0.63
315	OTH KIDNEY+URINARY TRACT OR PROCS	7163	1.06	2733	0.91	5649	1.30	1459	0.58
316	RENAL FAILURE W/O DIALYSIS	3490	1.23	779	0.94	3538	1.73	521	1.35
317	RENAL FAILURE WITH DIALYSIS	2500*	0.72	890*	0.83	0*	0.00	0*	0.00
318	KIDNEY+URIN TRACT NEOPLASM AGE>69 +/OR CC	2720	1.13	672	0.81	2393	1.71	546	1.15
319	KIDNEY+URIN TRACT NEOPLASM AGE<70 W/O CC	2010	0.97	643	0.88	2095	1.49	522	1.50
320	KIDNEY+URIN TRACT NEOPLASM AGE>69 +/OR CC	2482	0.94	551	0.72	1809	0.87	308	0.86
321	KIDNEY+URIN TRACT INFEC AGE 18-69 W/O CC	2120	1.19	552	0.88	1619	0.99	301	0.74
322	KIDNEY+URIN TRACT INFEC AGE 0-17	2399	0.86	511	0.82	7390*	0.00	349*	0.00
323	URINARY STONES AGE>69 AND/OR CC	1624	0.88	505	0.74	1524	1.62	394	1.21
324	URINARY STONES AGE<70 W/O CC	1265	0.80	424	0.69	1114	1.33	313	1.13
325	KIDNEY+URIN TRACT SIGNS+SYMPS AGE>69 +/OR CC	1983	0.93	599	0.86	1619	1.06	369	1.18
326	KIDNEY+URIN TRACT SIGNS+SYMPS AGE 18-69 W/O CC	1509	0.83	559	0.83	1486	0.90	354	0.75
327	KIDNEY+URIN TRACT SIGNS+SYMPS AGE 0-17	1768	0.80	446	0.72	0*	0.00	0*	0.00
328	URETHRAL STRICTURE AGE>69 +/OR CC	1645	0.80	569	0.59	1744	1.03	401	0.81
329	URETHRAL STRICTURE AGE 18-69 W/O CC	1888	1.13	577	0.62	1726	1.22	462	0.89
330	URETHRAL STRICTURE AGE 0-17	1327*	0.62	449*	0.44	0*	0.00	0*	0.00
331	OTH KIDNEY+URIN TRACT DXS AGE>69 +/OR CC	2685	1.04	709	0.94	2242	1.36	438	1.06
332	OTH KIDNEY+URIN TRACT DXS AGE18-69 W/O CC	2132	1.57	650	1.25	2038	1.38	434	1.25
333	OTH KIDNEY+URIN TRACT DXS AGE 0-17	2370	0.81	621	0.64	1762*	0.00	173*	0.00
334	MAJOR MALE PELVIC PROCS W CC	3577	0.61	2145	0.35	2712	0.58	1462	0.26
335	MAJOR MALE PELVIC PROCS W/O CC	3439	0.57	2031	0.26	2818	0.71	1481	0.26
336	TURP AGE>69 +/OR CC	2767	0.77	1679	0.30	2165	0.63	1219	0.23
337	TURP AGE<70 W/O CC	2231	0.70	1545	0.21	1886	0.64	1174	0.21
338	TESTES PROCS FOR MALIGNANCY	2938	1.25	1246	0.56	1891	0.85	635	0.53
339	TESTES PROCS NONMALIGNANCY AGE>70	1679	1.17	894	0.57	1409	0.78	556	0.36
340	TESTES PROCS NONMALIGNANCY AGE 0-17	2263*	0.28	1048*	0.37	0*	0.00	0*	0.00
341	PENIS PROCEDURES	2372	0.62	1297	0.56	3387	0.52	1612	0.48
342	CIRCUMCISION AGE >17	1025	0.65	426	0.74	0*	0.00	0*	0.00
343	CIRCUMCISION AGE 0-17	2485*	0.99	645*	0.61	0*	0.00	0*	0.00
344	OTH MALE REPRO SYS OR PROCS FOR MALG	2665	1.07	1242	0.65	4667*	0.65	1533*	0.59
345	OTH MALE REPRO SYS OR PROCS EXC MALG	1928	0.96	925	0.74	2359	0.94	842	0.54
346	MALIGNANCY, MALE REPRO SYS AGE>69 +/OR CC	2509	0.99	668	0.88	2070	1.25	454	1.09
347	MALIGNANCY, MALE REPRO SYS AGE<70 W/O CC	1916	0.98	605	0.89	1782	0.97	451	0.91
348	BENIGN PROSTATIC HYPERTROPHY AGE>69 +/OR CC	1713	1.27	606	0.96	1630	1.23	477	1.05
349	BENIGN PROSTATIC HYPERTROPHY AGE<70 W/O CC	1292	0.77	549	0.89	1331	0.83	461	0.95
350	INFLAMMATION MALE REPROD SYSTEM	1739	0.90	476	0.75	1440	0.84	299	0.87
352	OTH MALE REPROD SYS DIAGNOSES	1849	0.79	593	0.75	1228	0.65	436	0.78
353	PELVIC EVIS,RADICAL HYSTERECTOMY+VULVECTOMY	4201	0.86	1882	0.46	4532*	0.88	1886*	0.72
354	NONRADICAL HYSTERECTOMY AGE>69 +/OR CC	3128	1.30	1690	0.28	2755	0.80	1210	0.28
355	NONRADICAL HYSTERECTOMY AGE<70 W/O CC	2600	0.72	1581	0.24	2485	0.78	1143	0.28
356	FEMALE REPROD SYS RECONSTRUCTIVE PROCS	2173	0.62	1159	0.36	1831	0.49	796	0.31

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
357	UTERUS+ADENEXA PROCS FOR MALIGNANCY	4661*	0.46	1864*	0.39	6129*	0.58	1786*	0.23
358	UTERUS+ADENEXA PROCS FOR NONMALIG EX TUBAL INTER	3081	0.67	1413	0.43	2951	0.87	992	0.34
359	TUBAL INTERRUPTION FOR NONMALIGNANCY	4197*	0.00	2259*	0.00	0*	0.00	0*	0.00
360	VAGINA,CERVIX+VULVA PROCS	1806	1.13	761	0.82	1698	0.94	598	0.68
361	LAPAROSCOPY+ENDOSCOPY (FEMALE) EXC TUBAL INTRP	855*	0.31	722*	0.16	1650*	0.69	642*	0.35
362	LAPAROSCOPIC TUBAL INTERRUPTION	804*	0.00	663*	0.00	0*	0.00	0*	0.00
363	D+C, CONIZATION+RADIO-IMPL FOR MALIG	1518	1.14	702	0.66	2050	0.77	494	0.45
364	D+C, CONIZATION EXC MALIG	952	0.77	485	0.37	921	0.79	353	0.49
365	OTH FEMALE REPROD SYS OR PROCS	4965	0.85	1702	0.54	3963	0.81	1089	0.48
366	MALIGNANCY OF FEMALE REPROD SYS AGE>69 +/OR CC	2709	1.11	579	1.01	2318	1.33	404	1.22
367	MALIGNANCY OF FEMALE REPROD SYS AGE<70 W/O CC	2316	1.45	548	1.31	1713	1.15	294	1.35
368	INFECTIONS, FEMALE REPROD SYS	2470	1.17	581	0.88	1481	0.90	344	0.89
369	MENSTRUAL+OTH FEMALE REPROD SYS DISORDERS	1822	1.04	575	0.86	1735	1.20	401	0.95
370	CESAREAN SECTION W CC	2480*	0.00	726*	0.00	0*	0.00	0*	0.00
371	CESAREAN SECTION W/O CC	2116*	0.64	1129*	0.30	4232*	1.02	1063*	0.31
372	VAGINAL DELIVERY W COMPLICATED DX	0*	0.00	0*	0.00	886*	0.00	358*	0.00
373	VAGINAL DELIVERY W/O COMPLICATED DX	1955*	1.36	495*	0.62	711*	0.81	144*	0.47
376	POSTPARTUM DX W/O OR PROC	9646*	0.00	877*	0.00	0*	0.00	0*	0.00
378	ECTOPIC PREGNANCY	436*	0.00	142*	0.00	0*	0.00	0*	0.00
379	THREATENED ABORTION	1135*	0.14	482*	0.09	766*	0.33	333*	0.49
380	ABORTION W/O D+C	3529*	0.83	1121*	0.02	1931*	0.96	538*	0.52
381	ABORTION WITH D+C	593*	0.04	464*	0.08	0*	0.00	0*	0.00
383	OTH ANTEPARTUM DX W MED COMPLICATIONS	910*	0.76	368*	0.98	1402*	0.51	153*	0.39
384	OTH ANTEPARTUM DX W/O MED COMPLICATIONS	1024*	0.00	370*	0.00	0*	0.00	0*	0.00
385	NEONATES, DIED OR TRANSFERRED	3100*	0.71	721*	0.72	0*	0.00	0*	0.00
386	EXTREME IMMATURITY, NEONATE	2447*	0.40	470*	0.27	0*	0.00	0*	0.00
389	FULL TERM NEONATE W MAJOR PROBLEMS	4275*	1.02	935*	0.89	818*	0.44	187*	0.37
390	NEONATES W OTHER SIGNIFICANT PROBLEMS	2653*	0.73	795*	0.77	857*	0.00	147*	0.00
391	NORMAL NEWBORNS	998*	0.00	165*	0.00	2202*	0.00	263*	0.00
392	SPLENECTOMY AGE>17	8061	0.73	2365	0.38	6409*	0.84	1713*	0.54
393	SPLENECTOMY AGE 0-17	7038*	0.00	3662*	0.00	0*	0.00	0*	0.00
394	OTHER OR PROCS OF BLOOD+BLOOD FORMING ORGANS	2329	0.97	980	0.76	4400*	2.27	685*	1.02
395	RED BLOOD CELL DISORDERS AGE>17	2190	0.99	569	0.93	1689	1.06	322	0.94
396	RED BLOOD CELL DISORDERS AGE 0-17	2197	0.66	471	0.58	0*	0.00	0*	0.00
397	COAGULATION DISORDERS	2453	0.78	569	0.71	3067	2.50	373	1.01
398	RETICULO+IMMUNITY DISORDERS AGE>69 +/OR CC	2587	1.23	601	0.89	2286	1.17	401	1.08
399	RETICULO+IMMUNITY DISORDERS AGE<70 W/O CC	2453	1.09	661	0.88	2497	1.32	383	1.13
400	LYMPHOMA OR LEUKEMIA W MAJ OR PROCS	7915*	1.10	3401*	0.90	9833*	0.65	2061*	0.11
401	LYMPHOMA OR LEUKEMIA W MINOR PROC AGE >69 +/OR CC	2639	0.63	1075	0.42	3131*	0.68	1107*	0.78
402	LYMPHOMA OR LEUKEMIA W MINOR OR PROC AGE<70 W/O CC	2835	1.06	1169	0.44	2392*	0.75	566*	0.28
403	LYMPHOMA OR LEUKEMIA AGE>69 +/OR CC	3420	1.24	716	0.92	2919	1.47	431	0.99
404	LYMPHOMA OR LEUKEMIA AGE 18-69 W/O CC	3003	1.11	670	1.03	2735	1.43	431	0.98
405	LYMPHOMA OR LEUKEMIA AGE 0-17	3299	0.94	662	0.77	0*	0.00	0*	0.00
406	MYEL DISO PLY DIF NEOP W MAJ OR PROC + CC	8660*	0.34	3196*	0.27	0*	0.00	0*	0.00
407	MYEL DISO PLY DIF NEOP W MAJ OR PROC W/O CC	6121*	0.80	2786*	0.53	5386*	0.93	1950*	0.46
408	MYEL DISO PLY DIF NELP W MNR OR PROC	3060	0.72	1495	0.57	1890*	0.64	608*	0.45
409	RADIOTHERAPY	3280	0.84	762	0.73	1261	1.43	246	1.40
410	CHEMOTHERAPY	1023	1.09	250	1.12	846	1.00	129	1.18
411	HISTORY OF MALIGNANCY W/O ENDOSCOPY	1457*	0.97	386*	0.46	1367	1.22	283	0.83
412	HISTORY OF MALIGNANCY W ENDOSCOPY	1009	0.79	459	0.55	1169*	0.83	443*	0.61

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
413	OR MYEL DISORD PRLY DIF NEOP AGE>69 +/OR CC	2657	0.99	633	0.90	2266	1.26	497	1.30
414	OR MYEL DISORD PRLY DIF NEOP DX AGE<70 W/O CC	2508	1.18	684	1.19	2063	1.28	510	1.66
415	OR PROCS FOR INFECT+PARAS DISEASES	6977	0.95	2075	0.61	7135*	1.02	1455*	0.75
416	SEPTECEMIA AGE>17	3660	0.90	673	0.87	3019	1.38	416	1.00
417	SEPTECEMIA AGE 0-17	4861	1.62	718	1.10	0*	0.00	0*	0.00
418	POSTOP+POSTTRAUMATIC INFECT	2802	0.85	507	0.87	3507	2.12	418	1.46
419	FEVER UNKNWN ORIGIN AGE>69 +/OR CC	2668	0.96	574	0.87	2065	1.05	313	0.82
420	FEVER UNKNWN ORIGIN AGE 18-69 W/O CC	2690	0.86	641	0.72	2011	1.14	305	0.81
421	VIRAL ILLNESS AGE>17	1584	0.86	392	0.85	1210	0.86	212	0.78
422	VIRAL ILLNESS+FEVER UNKNWN ORIGIN AGE 0-17	1532*	0.68	318*	0.61	0*	0.00	0*	0.00
423	OTHER INFECT+PARAS DISEASES DXS	3766	0.94	709	0.75	2980	1.93	409	1.26
424	OTHER PROCS W PRINCIPAL DX OF MENTAL ILLNESS	6057	0.87	2286	0.62	4147*	0.67	805*	0.92
425	ACUTE ADJ REACT+DIST PSYCHSOCIAL DYSFUNCTION	1861	0.92	525	0.84	1637	1.42	299	0.96
426	DEPRESSIVE NEUROSES	2587	0.75	805	0.77	2028	1.15	400	1.17
427	NEUROSES EXC DEPRESSIVE	2522	0.88	704	1.00	1471	0.85	502	2.41
428	DISORDERS OF PERSONALITY+IMPULSE CONTROL	3460	1.16	615	0.82	2234	1.08	440	1.10
429	ORGANIC DISTURBANCES+MENTAL RETARDATION	2789	0.89	687	0.74	1924	0.96	343	0.80
430	PSYCHOSES	3371	0.77	956	0.75	2219	1.13	407	1.05
431	CHILDHOOD MENTAL DISORDERS	2901*	0.99	643*	0.56	2047*	1.32	410*	0.91
432	OTHER DXS OF MENTAL DISORDERS	2436*	0.85	564*	0.59	1483	0.87	363	1.01
434	DRUG DEPENDENCE	1790*	0.61	607*	0.85	1766*	0.71	241*	0.92
435	DRUG USE EXC DEPENDENCE	2030*	0.74	555*	0.57	1650*	0.79	312*	0.95
436	ALCOHOL DEPENDENCE	2733	0.54	552	0.60	1496*	1.22	269*	0.90
437	ALCOHOL USE EXC DEPENDENCE	2103	0.90	559	1.32	1321	1.28	209	1.01
438	ALCOHOL+SUBS INDUCED ORGANIC MENTAL SYNDROME	2105	0.98	552	0.95	1380	1.46	220	1.20
439	SKIN GRAFTS FOR INJURIES	2697*	0.66	1010*	0.43	2548*	0.54	522*	0.56
440	WOUND DEBRIDEMENTS FOR INJURIES	4883*	1.07	1587*	1.15	4726*	1.13	686*	0.49
441	HAND PROCEDURES FOR INJURIES	1985*	1.28	904*	0.49	2762*	0.71	1153*	0.66
442	OTHER OR PROCS FOR INJURIES AGE>69 +/OR CC	4705*	0.74	2472*	0.69	4690	0.97	1605	0.67
443	OTHER OR PROCS FOR INJURIES AGE<70 W/O CC	3496*	1.11	2206*	0.95	4140	0.98	1461	0.65
444	MULTIPLE TRAUMA AGE>69 +/OR CC	2505	0.91	689	1.04	1898	0.75	307	0.76
445	MULTIPLE TRAUMA AGE 18-69 W/O CC	2781	0.97	823	1.51	1609	0.74	292	1.57
446	MULTIPLE TRAUMA AGE 0-17	1991*	0.56	467*	0.38	0*	0.00	0*	0.00
447	ALLERGIC REACTIONS >17	1214	0.87	276	0.59	1298	0.82	237	0.76
449	TOXIC EFFECTS OF DRUGS AGE>69 +/OR CC	2365	0.94	549	0.83	1764	1.52	272	0.82
450	TOXIC EFFECTS OF DRUGS AGE18-69 W/O CC	2074	1.04	496	0.85	1450	1.11	231	0.91
451	TOXIC EFFECTS OF DRUGS AGE0-17	1770	0.65	454	0.64	0*	0.00	0*	0.00
452	COMPLCATIONS OF TREATMENT AGE>69 +/OR CC	2854	1.20	536	1.09	2117	1.77	386	1.07
453	COMPLCATIONS OF TREATMENT AGE<70 W/O CC	2743	1.07	608	0.91	2575	1.71	493	1.51
454	OTH INJURIES,POIS+TOXIC EFF DXS AGE69 +/OR CC	3394	1.17	695	0.99	1965	1.31	302	1.10
455	OTH INJURISE,POIS+TOXIC EFF DXS AGE<70 W/O CC	1909	0.97	352	0.82	2747*	2.15	307*	1.09
457	EXTENSIVE BURNS	4185*	0.46	1737*	0.54	3854*	0.86	417*	0.69
458	NONEXTENSIVE BURNS W SKIN GRAFTS	6915*	0.61	1716*	0.71	3198*	1.59	1033*	0.84
459	NONEXTENSIVE BURNS W WOUND DEBRIDE	2456*	0.89	3264*	0.89	5863*	0.70	1006*	0.81
460	NONEXTENSIVE BURNS W/O OR PROCEDURE	3717	1.07	683	0.90	3367	2.28	684	1.98
461	OR PROC W DIAG OT CONTACT W HEALTH SVS	3397	1.09	1474	0.79	4935*	0.81	1412*	0.64
462	REHABILITATION	936*	0.00	134*	0.00	4070	0.60	333	0.56
463	SIGNS+SYMPTOMS WITH CC	2744	0.97	623	0.84	0*	0.00	0*	0.00
464	SIGNS+SYMPTOMS W/O CC	2378	0.93	598	0.92	2141	1.72	363	0.90
465	AFTERCARE W HX OF MALIG AS SECONDARY DX	932	0.41	425	0.35	0*	0.00	0*	0.00

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		NEW JERSEY				NORTH CAROLINA			
		PART A		PART B		PART A		PART B	
DRG	TITLE	MEAN	CV	MEAN	CV	MEAN	CV	MEAN	CV
466	AFTERCARE W/O HX OF MALIG AS SECONDARY DX	784	0.63	342	0.29	1912*	1.61	314*	0.77
467	OTHER FACTORS INFLUENCING HEALTH STATUS	1188	1.06	422	0.92	2272	1.14	435	1.16
468	UNRELATED OR PROCEDURE	4421	1.16	1986	0.67	3848	1.36	1386	0.69
469	PDX INVALID AS DISCHARGE DIAG	1428*	1.01	519*	0.45	2050	0.95	339	0.79
470	UNGROUPABLE	2420	1.30	655	2.10	2488	1.22	410	1.14

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

APPENDIX B

HOSPITAL AND PHYSICIAN DRG COST WEIGHTS
AND HOSPITAL LENGTHS OF STAY

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
1	CRANIOTOMY AGE>17 EXCEPT TRAUMA	2.750	3.979	3.213	3.952	28.61	22.96
2	CRANIOTOMY FOR TRAUMA AGE>17	2.826	3.857	3.204	3.364	27.88	19.66
3	CRANIOTOMY AGE<18	2.977*	3.766*	0.000*	0.000*	29.90*	0.00*
4	SPINAL PROCEDURES	2.296	3.528	3.561	3.477	28.36	22.02
5	EXTRACRANIAL VASCULAR PROCEDURES	1.362	3.242	1.767	3.680	14.46	12.46
6	CARPAL TUNNEL RELEASE	0.345	0.821	0.385	0.965	4.53	3.92
7	OTH NERV SYST PROCS AGE>69 +/OR CC	1.069	1.408	1.014	1.444	15.31	9.84
8	OTH NERV SYST PROCS AGE<70 W/O CC	0.744	1.156	0.867	1.343	10.45	9.44
9	SPINAL DISORDERS+INJURIES	1.526	0.830	1.113	0.662	23.39	17.79
10	NERVOUS SYSTEM NEOPLASMS AGE>69 AND/OR CC	1.159	0.850	1.423	0.785	18.46	13.66
11	NERVOUS SYSTEM NEOPLASMS AGE<70 W/O CC	1.025	0.753	1.176	0.759	16.50	13.39
12	DEGENERATIVE NERVOUS SYSTEM DISORDERS	1.041	0.696	1.025	0.657	17.55	16.76
13	MULTIPLE SCLEROSIS+CEREBELLAR ATAXIA	0.994	0.597	1.017	0.775	16.32	14.01
14	SPECIFIC CEREBROVASCULAR DISORDERS WITH CC	1.261	0.759	1.075	0.667	18.98	16.42
15	TRANSIENT ISCHEMIC ATTACKS	0.641	0.572	0.587	0.548	10.86	7.81
16	NONSPECIFIC CEREBROVASCULAR DISORDERS WITH CC	1.023	0.734	0.000*	0.000*	16.76	0.00*
17	NONSPECIFIC CEREBROVASCULAR DISORDERS W/O CC	0.702	0.589	0.779	0.591	12.31	11.60
18	CRANIAL+PERIPH NERVE DISORDERS AGE>69 +/OR CC	0.774	0.702	0.873	0.752	12.54	10.54
19	CRANIAL+PERIPH NERVE DISORDERS AGE<70 W/O CC	0.659	0.631	0.954	0.753	11.73	10.62
20	NERVOUS SYSTEM INFECTION EXCEPT VIRAL MENING	1.251	0.861	1.360	0.787	17.44	14.22
21	VIRAL MENINGITIS	1.296*	0.839*	0.641	0.439	17.91*	10.15
22	HYPERTENSIVE ENCEPHALOPATHY	0.899	0.592	0.684	0.413	11.72	8.70
23	NONTRAUMATIC STUPOR+COMA	1.321	0.814	0.643	0.523	14.23	8.56
24	SEIZURE+HEADACHE>69 AND/OR CC	0.774	0.578	0.687	0.499	11.98	8.93
25	SEIZURE+HEADACHE AGE 18-69 W/O CC	0.577	0.505	0.644	0.450	9.59	7.61
26	SEIZURE+HEADACHE AGE 0-17	0.712	0.528	0.000*	0.000*	15.44	0.00*
27	TRAUMATIC STUPOR+COMA, COMA>1 HR	1.775	1.054	1.926*	0.932*	18.43	11.59*
28	TRAUMATIC STUPOR+COMA<1 HR AGE>69 +/OR CC	1.019	0.787	1.449	0.742	13.20	12.44
29	TRAUMATIC STUPOR+COMA<1 HR AGE 18-69 W/O CC	0.914	0.619	1.205	0.649	10.58	11.25
30	TRAUMATIC STUPOR+COMA<1 HR AGE 0-17	0.840*	0.710*	0.000*	0.000*	11.94*	0.00*
31	CONCUSSION AGE>69 AND/OR CC	0.632	0.555	0.613	0.447	10.27	8.44
32	CONCUSSION AGE 18-69 W/O CC	0.446	0.479	0.367	0.354	7.73	6.32
33	CONCUSSION AGE 0-17	0.615	0.487	0.000*	0.000*	11.69	0.00*
34	OTHER DISORDERS OF NS AGE>69 AND/OR CC	1.018	0.710	0.929	0.790	14.82	11.78
35	OTHER DISORDERS OF NS AGE<70 W/OR CC	1.024	0.805	0.938	0.710	15.60	11.48
36	RETINAL PROCEDURES	0.602	2.235	0.892	2.399	6.32	6.63
37	ORBITAL PROCEDURES	0.589	1.211	0.725	1.335	6.89	5.51
38	PRIMARY IRIS PROCEDURES	0.306	0.930	0.390*	0.949*	3.94	3.59*
39	LENS PROCEDURES	0.401	1.833	0.468	2.064	4.16	3.68
40	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE>17	0.336	1.023	0.428	1.218	3.72	3.75
41	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE 0-17	0.255*	0.769*	0.000*	0.000*	3.33*	0.00*
42	INTRAOCULAR PROCS EXCEPT RETINA, IRIS+LENS	0.518	2.011	0.763	2.094	5.81	5.71
43	HYPHEMA	0.655*	0.502*	0.458*	0.526*	10.63*	7.83*
44	ACUTE MAJOR EYE INFECTIONS	0.824	0.554	0.718	0.462	13.46	11.19
45	NEUROLOGICAL EYE DISORDERS	0.475	0.596	0.643	0.741	8.16	6.37
46	OTHER DISORDERS OF THE EYE AGE>17 WITH CC	0.673	0.662	0.000*	0.000*	10.82	0.00*
47	OTHER DISORDERS OF THE EYE AGE>17 W/O CC	0.582	0.667	0.718	0.591	9.31	7.97
48	OTHER DISORDERS OF THE EYE AGE 0-17	0.861*	0.609*	0.000*	0.000*	13.63*	0.00*
49	MAJOR HEAD+NECK PROCEDURES	1.837	2.993	2.363	3.286	17.79	14.41
50	SIALOADENECTOMY	0.000*	0.000*	0.530*	1.922*	0.00*	6.00*

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
51	SALIVARY GLAND PROCS EXCEPT SIALOADENECTOMY	0.575	1.382	0.406*	1.037*	7.12	4.57*
52	CLEFT LIP+PALATE REPAIR	0.000*	0.000*	2.142*	3.293*	0.00*	7.00*
53	SINUS+MASTOID PROCEDURES AGE>17	0.484	1.324	0.587	1.543	5.51	5.65
54	SINUS+MASTOID PROCEDURES AGE 0-17	0.212*	0.615*	1.065*	2.065*	2.00*	7.87*
55	MISCELLANEOUS EAR, NOSE+THROAT PROCEDURES	0.404	1.088	0.440	1.588	4.47	4.19
56	RHINOPLASTY	0.384	1.286	0.423	1.151	4.40	4.09
57	OTH T+A PROCS AGE>17	0.433*	0.553*	0.784*	1.029*	5.90*	7.50*
59	TONSILLECTOMY +/OR ADENOIDECTOMY AGE>17	0.209*	0.309*	0.000*	0.000*	2.00*	0.00*
61	MYRINGOTOMY AGE>17	0.245*	0.416*	0.222*	0.378*	2.42*	2.75*
63	OTHER EAR, NOSE+THROAT O.R. PROCEDURES	1.312	1.607	1.613	2.021	14.82	10.85
64	EAR, NOSE+THROAT MALIGNANCY	0.870	0.683	1.076	0.872	12.18	11.08
65	DYSEQUILIBRIUM	0.484	0.473	0.451	0.393	8.66	6.60
66	EPISTAXIS	0.442	0.393	0.518	0.351	7.71	6.52
67	EPIGLOTTITIS	0.340*	0.351*	0.422*	0.510*	4.00*	10.19*
68	OTITIS MEDIA+URI AGE>69 AND/OR CC	0.633	0.475	0.680	0.392	9.40	9.16
69	OTITIS MEDIA+URI AGE 18-65 W/O CC	0.652	0.453	0.539	0.383	8.16	7.92
70	OTITIS MEDIA+URI AGE 0-17	0.526*	0.367*	0.000*	0.000*	10.72*	0.00*
71	LARYNGOTRACHEITIS	0.303*	0.281*	4.200*	0.785*	5.50*	9.50*
72	NASAL TRAUMA+DEFORMITY	0.803	0.637	0.646	0.550	10.51	10.01
73	OTHER EAR, NOSE+THROAT DIAG. AGE>17	0.714	0.661	0.639	0.542	9.49	8.72
74	OTHER EAR, NOSE+THROAT DIAG. AGE 0-17	0.631*	0.421*	0.000*	0.000*	12.39*	0.00*
75	MAJOR CHEST PROCEDURES	2.500	3.448	2.712	3.141	22.80	16.84
76	OR PROCS ON RESP SYS EXC MAJOR CHEST WITH CC	2.987	2.314	2.917*	3.988*	27.35	22.40*
77	OR PROCS ON RESP SYS EXC MAJOR CHEST W/O CC	2.384	1.923	2.384	2.180	21.05	16.23
78	PULMONARY EMBOLISM	1.158	0.743	1.350	0.753	15.23	13.98
79	RESP INFEC+INFLAM AGE>69 AND/OR CC	1.756	0.908	1.479	0.778	19.60	16.91
80	RESP INFEC+INFLAM AGE 18-69 W/O CC	1.518	0.861	1.175	0.758	19.41	18.09
81	RESP INFEC+INFLAM AGE 0-17	1.884	1.024	0.000*	0.000*	21.07	0.00*
82	RESPIRATORY NEOPLASMS	1.009	0.786	1.054	0.762	14.30	12.41
83	MAJOR CHEST TRAUMA AGE>69 AND/OR CC	0.841	0.656	1.323	0.625	13.37	12.12
84	MAJOR CHEST TRAUMA AGE<70 W/O CC	0.646	0.490	0.844*	0.674*	9.90	13.21*
85	PLEURAL EFFUSION AGE>69 AND/OR CC	0.947	0.798	1.254	0.825	14.11	13.10
86	PLEURAL EFFUSION AGE<70 W/O CC	0.913	0.836	1.274	0.811	13.37	11.35
87	PULMONARY EDEMA+RESPIRATORY FAILURE	1.299	0.671	1.287	0.623	14.35	11.31
88	CHRONIC OBSTRUCTIVE PULMONARY DISEASE	1.059	0.573	0.955	0.491	13.60	10.92
89	SIMPLE PNEUMONIA+PLEURISY AGE>69 AND/OR CC	1.085	0.601	0.986	0.511	14.46	12.19
90	SIMPLE PNEUMONIA+PLEURISY AGE 18-69 W/O CC	0.878	0.559	0.928	0.497	11.76	10.41
91	SIMPLE PNEUMONIA+PLEURISY AGE 0-17	1.058	0.544	0.000*	0.000*	14.72	0.00*
92	INTERSTITIAL LUNG DISEASE AGE>69 AND/OR CC	1.015	0.749	1.198	0.665	14.23	11.57
93	INTERSTITIAL LUNG DISEASE AGE<70 W/O CC	0.743	0.605	1.224	0.971	9.81	13.31
94	PNEUMOTHORAX AGE>69 AND/OR CC	1.194	0.869	1.242	0.780	15.15	13.21
95	PNEUMOTHORAX AGE<70 W/O CC	0.523	0.546	0.983	0.711	8.82	11.57
96	BRONCHITIS+ASTHMA AGE>69 AND/OR CC	0.778	0.448	0.696	0.394	11.18	9.50
97	BRONCHITIS+ASTHMA AGE 18-69 W/O CC	0.744	0.438	0.699	0.381	10.66	8.87
98	BRONCHITIS+ASTHMA AGE 0-17	0.741	0.422	0.000*	0.000*	10.60	0.00*
99	RESP SIGNS+SXS AGE>69 +/OR CC	0.914	0.620	0.736	0.534	11.57	8.30
100	RESP SIGNS+SXS AGE<70 W/O CC	0.764	0.569	0.631	0.508	10.24	7.16
101	OTHER RESP DIAG AGE>69 AND/OR CC	0.823	0.571	1.025	0.603	11.85	11.57
102	OTHER RESP DIAG AGE<70	0.856	0.653	0.883	0.583	11.71	11.00
104	CARDIAC VALVE PROC W/ PUMP+CARDIAC CATH	4.394	5.176	9.877*	7.615*	21.65	22.53*

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
105	CARDIAC VALVE PROC W/ PUMP+W/O CARDIAC CATH	6.691	5.602	6.369	7.233	26.29	18.30
106	CORONARY BYPASS WITH CARDIAC CATH	4.581	7.754	8.388	8.013	23.44	18.17
107	CORONARY BYPASS W/O CARDIAC CATH	3.503	6.852	4.711	8.435	17.35	15.78
108	CARDIOTHORACIC EXC VALVE+CABG WITH PUMP	5.767*	5.110*	7.339*	6.954*	19.19*	19.06*
109	CARDIOTHORACIC PROCEDURES W/O PUMP	3.230*	3.849*	3.539	3.465	20.94*	16.06
110	MAJOR RECONSTRUCT VASC PROCS AGE>69 +/OR CC	2.456	3.890	2.983	4.588	22.12	17.61
111	MAJOR RECONSTRUCT VASC PROCS AGE<70 W/O CC	1.853	3.561	2.558	4.583	17.03	16.15
112	VASCULAR PROCEDURES EXCEPT MAJOR RECON	2.079	2.995	2.061	3.018	20.23	14.54
113	AMPUT FOR CIRC SYS DISORDERS EXC UP LIMB+TOE	2.500	2.144	1.856	1.838	32.83	22.03
114	UPPER LIMB+TOE AMPUT FOR CIRC SYS DISORDERS	2.020	1.526	1.681	0.967	28.44	19.57
115	PERM CARDIAC PACEMAKER IMPLANT WITH AMI OR CHF	3.078	2.582	3.510	2.739	20.24	15.61
116	PERM CARDIAC PACEMAKER IMPLANT W/O AMI OR CHF	2.365	2.248	2.851	2.509	14.37	11.77
117	CARDIAC PACEM REPL+REVIS EXC PULSE GEN REPL ONLY	1.448	1.156	1.409*	1.237*	7.35	6.84*
118	CARDIAC PACEMAKER PULSE GENERATOR REPLACE ONLY	2.170*	2.086*	2.586*	2.088*	9.28*	7.25*
119	VEIN LIGATION+STRIPPING	0.768	1.138	0.699	1.167	10.60	7.72
120	OTHER O.R. PROCEDURES ON THE CIRCULATORY SYSTEM	2.588	2.035	2.000	2.015	28.42	15.82
121	CIRC DISORDERS WITH AMI+CV COMPLICS, ALIVE	1.385	0.759	0.000*	0.000*	16.37	0.00*
122	CIRC DISORDERS WITH AMI W/O CV COMPLICS, ALIVE	1.071	0.623	1.439	0.765	13.28	13.97
123	CIRCULATORY DISORDERS WITH AMI, EXPIRED	1.286	0.746	1.166	0.619	10.77	6.67
124	CIRC DISORDERS EXC AMI, W/CARD CATH+COMPLEX DX	0.942	1.167	2.403*	2.189*	8.88	12.81*
125	CIRC DISORDERS EXC AMI, CARD CATH W/O COMPLEX DX	0.735	1.098	1.412	1.506	7.28	8.35
126	ACUTE+SUBACUTE ENDOCARDITIS	1.985	1.083	2.701*	1.365*	25.00	26.20*
127	HEART FAILURE+SHOCK	0.945	0.571	0.969	0.555	13.44	11.01
128	DEEP VEIN THROMBOPHLEBITIS	0.792	0.532	0.793	0.464	13.57	11.92
129	CARDIAC ARREST	1.698	0.875	1.281	0.573	14.28	10.30
130	PERIPH VASCULAR DISORDERS AGE>69 AND/OR CC	0.827	0.654	0.848	0.644	12.58	11.32
131	PERIPH VASCULAR DISORDERS AGE<70 W/O CC	0.727	0.683	0.788	0.698	10.96	9.92
132	ATHEROSCLEROSIS AGE>69 AND/OR CC	0.848	0.542	0.894	0.587	12.11	10.64
133	ATHEROSCLEROSIS AGE<70 W/O CC	0.859	0.590	0.871	0.688	11.01	8.35
134	HYPERTENSION	0.689	0.520	0.700	0.509	11.05	9.41
135	CARDIAC CONGENITAL+VALVE DIS AGE>69 +/OR CC	0.915	0.616	1.159	0.930	11.86	10.16
136	CARDIAC CONGENITAL+VALVE DIS AGE 18-69 W/O CC	1.127	1.141	1.273	1.555	11.75	8.98
137	CARDIAC CONGENITAL+VALVE DIS AGE 0-17	0.924*	0.572*	0.000*	0.000*	13.47*	0.00*
138	CARDIAC ARRHYTHM+CONDUCTION DIS AGE>69 +/OR CC	0.797	0.549	0.952	0.610	10.72	9.15
139	CARDIAC ARRHYTHMIA+CONDUCTION DIS AGE<70 W/O CC	0.731	0.501	0.827	0.574	9.32	7.75
140	ANGINA PECTORIS	0.685	0.466	0.728	0.528	9.83	7.76
141	SNYCOPE+COLLAPSE AGE>69 AND/OR CC	0.648	0.526	0.656	0.477	10.23	8.09
142	SYNCOPE+COLLAPSE AGE<70 W/O CC	0.623	0.529	0.638	0.507	9.42	6.94
143	CHEST PAIN	0.621	0.450	0.744	0.490	8.69	7.09
144	OTHER CIRCULATORY DIAGNOSES WITH CC	0.926	0.608	0.000*	0.000*	11.78	0.00*
145	OTHER CIRCULATORY DIAGNOSES W/O CC	0.923	0.650	0.961	0.706	12.64	10.83
146	RECTAL RESECTION AGE>69 AND/OR CC	2.289	2.875	2.711	3.069	25.00	22.01
147	RECTAL RESECTION AGE<70 W/O CC	1.792	2.599	2.136*	2.960*	19.82	16.24*
148	MAJ SM+LGE BOWEL PROCS AGE>69 +/OR CC	2.334	2.542	2.311	2.672	23.59	19.84
149	MAJ SM+LGE BOWEL PROCS AGE<70 W/O CC	1.920	2.426	1.993	2.540	20.54	16.70
150	PERITONEAL ADHESIOLYSIS>69 AND/OR CC	1.694	1.758	1.948	2.047	18.76	16.70
151	PERITONEAL ADHESIOLYSIS<70 W/O CC	1.412	1.593	1.632	1.754	16.69	14.96
152	MINOR SM+LGE BOWEL PROCS AGE>69 +/OR CC	1.232	1.394	1.340	1.853	14.95	12.97
153	MINOR SM+LGE BOWEL PROCS AGE<70 W/O CC	1.416	1.720	1.172*	1.412*	16.55	10.52*
154	STOMACH, ESOPH+DUODENAL PROCS AGE>69 +/OR CC	2.723	2.692	2.598	2.501	24.14	18.43

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
155	STOMACH, ESOPH+DUODENAL PROCS AGE 18-69 W/O CC	2.130	2.582	2.075	2.391	21.38	15.21
156	STOMACH, ESOPH+DUODENAL PROCS AGE 0-17	5.400*	3.501*	0.000*	0.000*	29.34*	0.00*
157	ANAL PROCEDURES AGE>69 AND/OR CC	0.614	0.984	0.631	0.909	8.47	7.29
158	ANAL PROCEDURES AGE<70 W/O CC	0.470	0.825	0.608	0.865	6.89	7.13
159	HERNIA PROCS EXC ING+FEMORAL AGE>69 +/OR CC	0.810	1.298	0.834	1.285	10.70	9.42
160	HERNIA PROCS EXC ING+FEMORAL AGE 18-69 W/O CC	0.729	1.180	0.870	1.317	9.12	8.81
161	INGUINAL+FEMORAL HERNIA PROCS AGE>69 +/OR CC	0.572	1.017	0.626	1.086	7.66	6.94
162	INGUINAL+FEMORAL HERNIA PROCS AGE 18-69 W/O CC	0.467	0.934	0.525	1.042	6.39	5.87
163	HERNIA PROCEDURES AGE 0-17	0.640	1.053	0.000*	0.000*	9.16	0.00*
164	APPENDECTOMY W COMPLIC PRINC DX AGE>69 +/OR CC	1.478	1.317	1.264	1.262	16.34	11.15
165	APPENDECTOMY W COMPLIC PRINC DX AGE<70 W/O CC	1.305	1.205	1.535	1.419	13.95	11.39
166	APPENDECTOMY W/O COMPLIC PRINC DX AGE>69 +/OR CC	1.154	1.173	1.488	1.290	12.53	10.45
167	APPENDECTOMY W/O COMPLIC PRINC DX AGE<70 W/O CC	0.783	1.009	0.651	1.104	9.38	6.65
168	PROCEDURES ON THE MOUTH AGE>69 AND/OR CC	1.440	2.003	1.687	1.911	16.60	12.16
169	PROCEDURES ON THE MOUTH AGE<70 W/O CC	1.332*	2.126*	0.705*	1.467*	16.19*	6.37*
170	OTHER DIGESTIVE SYSTEM PROCS AGE>69 +/OR CC	1.968	1.894	2.307	1.895	21.55	16.66
171	OTHER DIGESTIVE SYSTEM PROCS AGE<70 W/O CC	1.641	1.817	1.901	1.996	18.36	15.24
172	DIGESTIVE MALIGNANCY AGE>69 AND/OR CC	1.019	0.787	0.967	0.796	15.17	12.49
173	DIGESTIVE MALIGNANCY AGE<70 W/O CC	0.893	0.758	0.940	0.993	12.55	10.48
174	G.I. HEMORRHAGE AGE>69 AND/OR CC	0.861	0.730	0.857	0.689	12.01	9.84
175	G.I. HEMORRHAGE AGE<70 W/O CC	0.757	0.718	0.759	0.674	10.53	8.32
176	COMPLICATED PEPTIC ULCER	0.808	0.797	1.102	1.037	11.74	11.82
177	UNCOMPLICATED PEPTIC ULCER>69 AND/OR CC	0.670	0.667	0.672	0.641	11.03	9.44
178	UNCOMPLICATED PEPTIC ULCER <70 W/O CC	0.605	0.624	0.557	0.579	9.43	7.98
179	INFLAMMATORY BOWEL DISEASE	1.003	0.792	1.001	0.863	14.61	12.83
180	G.I. OBSTRUCTION AGE>69 AND/OR CC	0.766	0.594	0.715	0.568	11.73	10.24
181	G.I. OBSTRUCTION AGE<70 W/O CC	0.591	0.528	0.658	0.498	9.11	7.90
182	MISC DIGESTIVE DIS AGE>69 +/OR CC	0.654	0.585	0.583	0.527	10.45	8.28
183	MISC DIGESTIVE DIS AGE 18-69 W/O CC	0.575	0.570	0.535	0.531	9.27	7.56
184	MISC DIGESTIVE DIS AGE 0-17	0.643	0.543	0.197*	0.455*	10.92	5.00*
185	DENTAL+ORAL DIS EXC EXTRAC+RESTOR AGE>17	0.794	0.600	0.771	0.547	11.30	9.99
186	DENTAL+ORAL DIS. EXC. EXTRAC+RESTOR, AGE 0-17	0.832*	0.397*	0.000*	0.000*	12.00*	0.00*
187	DENTAL EXTRACTIONS+RESTORATIONS	0.382	0.218	0.552	0.281	5.37	5.39
188	OTHER DIGESTIVE SYSTEM DX AGE>69 +/OR CC	0.715	0.694	0.712	0.703	10.28	8.94
189	OTHER DIGESTIVE SYSTEM DX AGE 18-69 W/O CC	0.629	0.714	0.644	0.670	8.77	7.40
190	OTHER DIGESTIVE SYSTEM DIAGNOSES AGE 0-17	0.799	0.647	1.416*	0.828*	12.55	10.16*
191	MAJOR PANCREAS, LIVER+SHUNT PROCEDURES	4.080	4.201	3.618	3.619	31.25	22.85
192	MINOR PANCREAS, LIVER+SHUNT PROCEDURES	4.015*	3.072*	3.970*	2.774*	33.50*	18.39*
193	BILIARY TRACT PROC EXC TOT CHOLEC AGE>69 +/OR CC	2.179	2.605	2.445	2.866	23.99	21.38
194	BILIARY TRACT PROC EXC TOT CHOLEC AGE<70 W/O CC	2.282	2.408	1.634	2.470	25.18	16.29
195	TOTAL CHOLECYST W C.D.E. AGE>69 +/OR CC	1.792	2.189	1.908	2.385	20.15	16.96
196	TOTAL CHOLECYST W C.D.E. AGE<70 W/O CC	1.480	1.970	1.431	2.284	16.82	14.93
197	TOTAL CHOLECYST W/O C.D.E. AGE>69 +/OR CC	1.362	1.846	1.388	1.990	15.86	13.68
198	TOTAL CHOLECYST W/O C.D.E. AGE<70 W/O CC	0.993	1.624	1.126	1.887	12.39	11.45
199	HEPATOBILIARY DIAG PROC FOR MALIGNANCY	1.779	1.942	2.211*	2.089*	23.60	24.15*
200	HEPATOBILIARY DIAG PROC FOR NON-MALIGNANCY	1.462	1.545	1.750	1.852	16.73	16.94
201	OTHER HEPATOBILIARY OR PANCREAS O.R. PROCEDURES	1.473*	2.517*	2.141*	2.274*	18.90*	16.00*
202	CIRRHOSIS+ALCOHOLIC HEPATITIS	1.000	0.691	1.151	0.767	15.01	12.15
203	MALIGNANCY OF HEPATOBILIARY SYSTEM OR PANCREAS	0.959	0.681	1.078	0.758	14.79	12.72
204	DISORDERS OF PANCREAS EXCEPT MALIGNANCY	0.780	0.632	0.859	0.644	11.10	10.92

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

DRG	TITLE	RELATIVE WEIGHTING FACTORS NEW JERSEY PART A	NEW JERSEY PART B	NORTH CAROLINA PART A	NORTH CAROLINA PART B	MEAN LENGTH OF STAY N.J.	N.C.
205	LIVER DIS EXC MALIG CIRR ALC HEPA AGE>69 OR CC	1.023	0.745	1.097	0.728	15.33	13.54
206	LIVER DIS EXC MALIG CIRR ALC HEPA AGE<70 W/O CC	0.886	0.701	0.903	0.663	13.40	12.17
207	DISORDERS OF THE BILIARY TRACT AGE>69 AND/OR CC	0.743	0.638	0.734	0.688	11.00	9.40
208	DISORDERS OF THE BILIARY TRACT AGE<70 W/O CC	0.613	0.601	0.629	0.657	9.27	7.89
209	MAJOR JOINT PROCEDURES	1.982	2.828	2.471	4.113	22.73	17.48
210	HIP+FEMUR PROCS EXC MAJ JOINT AGE>69 +/OR CC	1.793	2.226	1.781	2.165	24.52	18.41
211	HIP+FEMUR PROCS EXC MAJ JOINT AGE 18-69 W/O CC	1.611	2.107	1.848	2.170	22.06	16.93
212	HIP+FEMUR PROCS EXC MAJ JOINT AGE 0-17	1.643	2.113	0.000*	0.000*	22.46	0.00*
213	AMPUTATIONS FOR MUSCULOSKELETAL DISORDERS	1.916	1.566	1.769	1.865	26.78	17.87
214	BACK+NECK PROCEDURES AGE>69 AND/OR CC	1.978	3.128	1.858	2.936	27.45	15.76
215	BACK+NECK PROCEDURES AGE<70 W/O CC	1.440	2.759	1.737	2.908	20.30	14.85
216	BIOPSIES OF MUSCULOSK SYSTEM+CONN TISSUE	1.618	1.503	1.027*	0.952*	23.50	11.92*
217	WOUND DEBRID+SKIN GRAFT EXC HAND FOR MUSC DIS	1.395*	1.266*	1.647*	1.153*	20.91*	20.57*
218	LOW EXT+HUMER PROC EXC HIP FOOT FEMUR AGE>69 OR CC	1.260	1.566	1.372	1.693	18.30	14.58
219	LOW EXT+HUMER PROC EXC HIP FOOT FEMUR AGE 18-69	1.026	1.412	1.327	1.927	13.81	14.33
220	LOW EXT+HUMER PROC EXC HIP FOOT FEMUR AGE 0-17	1.137*	1.579*	0.000*	0.000*	16.91*	0.00*
221	KNEE PROCS AGE>69 +/OR CC	0.853	1.389	0.632	1.490	11.58	6.27
222	KNEE PROCS AGE<70 W/O CC	0.714	1.308	0.703	1.599	9.31	6.21
223	UPPER EXTREM PROC EXC HUMERUS+HAND AGE>69 +/OR CC	0.836	1.270	1.466	1.674	11.46	8.91
224	UPPER EXTREM PROC EXC HUMERUS+HAND AGE<70 W/O CC	0.763	1.227	1.041	1.795	9.31	8.00
225	FOOT PROCEDURES	0.719	0.993	0.695	1.221	10.32	7.12
226	SOFT TISSUE PROCS AGE>69 +/OR CC	0.761	0.995	0.914*	1.098*	11.15	7.79*
227	SOFT TISSUUE PROCS AGE<70 W/O CC	0.734	0.885	0.950	1.052	10.09	9.48
228	GANGLION (HAND) PROCEDURES	0.276*	0.896*	0.456*	0.440*	3.50*	4.00*
229	HAND PROCS EXC GANGLION	0.479	1.078	0.636	1.389	6.01	5.25
230	LOCAL EXCI+REMOV INT FIX DEVICES OF HIP+FEMUR	0.800	1.008	0.978*	1.150*	11.90	11.19*
231	LOCAL EXCI+REMOV INT FIX DEVICES EXC HIP+FMR	0.831	0.999	0.577*	1.234*	10.28	5.64*
232	ARTHROSCOPY	0.552	0.905	0.616	1.498	6.45	5.37
233	OTH MUSCULOSK OR TISSUE PROCS AGE>69 +/OR CC	0.948	1.391	1.107	1.575	12.80	9.70
234	OTH MUCULOSK OR TISSUE PROCS AGE<70 W/O CC	0.893	1.312	1.027	1.348	12.65	7.11
235	FRACTURES OF FEMUR	1.419	0.835	1.394	0.912	21.02	23.30
236	FRACTURES OF HIP+PELVIS	1.076	0.651	0.935	0.676	16.66	17.50
237	SPRAINS,STRAINS + DISLOC OF HIP, PELVIS+THIGH	0.632	0.494	0.737	0.566	11.60	12.75
238	OSTEOMYELITIS	1.394	0.734	1.517	0.818	19.79	19.55
239	PATH FXS+MUSCULOSKELETAL MALIGNANCY	0.942	0.680	0.902	0.639	15.31	12.01
240	CONNECTIVE TISSUE DIS AGE>69 +/OR CC	0.885	0.655	0.909	0.687	14.31	11.87
241	CONNECTIVE TISSUE DIS AGE<70 W/O CC	0.805	0.609	0.875	0.655	13.05	10.76
242	SEPTIC ARTHRITIS	1.324	0.883	1.299*	0.887*	18.38	18.39*
243	MEDICAL BACK PROBLEMS	0.711	0.583	0.642	0.524	12.85	9.90
244	BONE DIS&SEPTIC ARTHROPATHY AGE>69 +/OR CC	0.746	0.554	0.663	0.537	12.67	10.82
245	BONE DIS&SEPTIC ARTHROPATHY AGE<70 W/O CC	0.663	0.548	0.637	0.544	11.54	9.33
246	NON-SPECIFIC ARTHROPATHIES	0.726	0.568	0.609	0.438	12.42	9.45
247	SIGNS+SXS MUSCULOSK+CONN TISSUE	0.604	0.491	0.698	0.531	10.10	11.76
248	TENDONITIS, MYOSITIS+BURSITIS	0.586	0.517	0.600	0.543	10.36	9.07
249	AFTERCARE, MUCULOSKELETAL+CONN TISSUE DXS	0.852	0.707	0.708	0.716	15.14	13.04
250	FXS SPRNS ETC FOREARM HAND FOOT AGE>69 +/OR CC	0.593	0.648	0.644	0.539	10.57	11.31
251	FXS SPRNS ETC FOREARM HAND FOOT AGE 18-69 W/O CC	0.463	0.605	0.640	0.552	6.90	9.44
252	FXS SPRNS ETC FOREARM HAND FOOT AGE 0-17	0.490	0.590	0.000*	0.000*	10.29	0.00*
253	FXS SPRNS UP ARM L LEG EX FOOT AGE>69 +/OR CC	0.698	0.576	0.716	0.541	12.33	11.95
254	FXS SPRNS UP ARM L LEG EX FOOT AGE 18-69 W/O CC	0.539	0.534	0.782	0.624	9.93	12.05

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

DRG	TITLE	RELATIVE WEIGHTING FACTORS NEW JERSEY PART A	NEW JERSEY PART B	NORTH CAROLINA PART A	NORTH CAROLINA PART B	MEAN LENGTH OF STAY N.J.	N.C.
255	FXS SPRNS UP ARM L LEG EX FOOT AGE 0-17	0.590	0.524	0.000*	0.000*	11.62	0.00*
256	OTH DX OF MUSCULOSK SYS+CONN TISSUE	0.715	0.526	0.762	0.534	11.21	10.13
257	TOTAL MASTECTOMY FOR MALIG AGE>69 +/OR CC	0.965	1.555	1.018	1.772	12.36	10.63
258	TOTAL MASTECTOMY FOR MALIG AGE<70 W/O CC	0.803	1.505	1.004	1.849	10.26	9.99
259	SUBTOTAL MASTECTOMY MALIG AGE>69 +/OR CC	0.925	1.148	1.401*	2.086*	13.16	10.50*
260	SUBTOTAL MASTECTOMY MALIG AGE<70	0.535*	0.843*	1.941*	2.732*	6.91*	7.66*
261	BREAST PROC FOR NORMALIG EXC BIOP+EXC	0.718	1.401	0.697*	1.673*	9.45	7.25*
262	BREAST BIOP+LOC EXCI FOR NON-MALIG	0.356	0.560	0.408	0.554	4.46	3.98
263	SKIN GRAFTS FOR SKIN ULCER/CELLUL AGE>69 +/OR C	1.855	1.438	2.115*	1.601*	30.30	21.00*
264	SKIN GRAFTS FOR SKIN ULCER/CELLUL AGE<70 W/O CC	1.685	1.363	2.525*	2.012*	26.46	23.15*
265	SKIN GRAFTS EXC FOR SKIN ULCER OR CELLUL W CC	0.848	1.145	0.520*	1.283*	12.54	4.08*
266	SKIN GRAFTS EXC FOR SKIN ULCER OR CELLUL W/O CC	0.672	1.038	0.935	1.252	9.55	11.71
267	PERIANAL+PILONICAL PROCEDURES	0.821*	0.762*	0.530*	0.781*	8.37*	7.36*
268	SKIN SUBCUTANEOUS TISS+BREAST PLASTIC PROCS	0.547	1.034	0.538*	1.295*	7.73	6.33*
269	OTH SKIN SUBCUT TISS+BRST OR PROCS AGE>69 +/OR CC	1.044	1.117	1.256	1.266	14.77	13.26
270	OTH SKIN SUBCUT TISS+BRST OR PROCS AGE<70 W/O CC	0.913	1.043	1.412	1.175	11.77	13.40
271	SKIN ULCERS	1.263	0.733	1.039	0.752	21.04	17.96
272	MAJOR SKIN DISORDERS AGE>69 AND/OR CC	0.911	0.591	0.829	0.514	14.87	12.12
273	MAJOR SKIN DISORDERS AGE<70 W/O CC	0.688	0.514	0.854	0.554	10.66	9.87
274	MALIG BREAST DISORDERS AGE>69 +/OR CC	0.981	0.663	0.897	0.696	16.00	12.72
275	MALIG BREAST DISORDERS AGE<70 W/O CC	0.969	0.726	0.779	0.644	16.17	10.76
276	NON-MALIG BREAST DISORDERS	0.627	0.607	0.880	0.714	8.67	11.17
277	CELLULITIS AGE>69 +/OR CC	0.935	0.573	0.730	0.455	14.76	10.61
278	CELLULITIS AGE 18-69 W/O CC	0.747	0.491	0.714	0.443	12.02	9.80
279	CELLULITIS AGE 0-17	0.862	0.521	0.000*	0.000*	15.34	0.00*
280	TRAUMA TO SKIN SUBCUT TISS+BRST AGE>69 +/OR CC	0.681	0.529	0.578	0.411	11.95	9.15
281	TRAUMA SKIN SUBCUT TISS+BRST AGE18-69 W/O CC	0.613	0.566	0.680	0.532	9.81	9.11
282	TRAUMA SKIN SUBCUT TISS+BRST AGE 0-17	0.543	0.447	0.000*	0.000*	10.49	0.00*
283	MINOR SKIN DISORDERS AGE>69 AND/OR CC	0.686	0.561	0.736	0.567	11.29	10.44
284	MINOR SKIN DISORDERS AGE<70 W/O CC	0.591	0.538	0.675	0.524	9.69	9.58
285	AMPUTATIONS FOR ENDOC NUTR+METAB DISORDERS	2.662	2.002	1.934	1.746	37.84	24.50
286	ADRENAL+PITUITARY PROCEDURES	2.604*	3.881*	2.381*	3.501*	25.07*	17.00*
287	SKIN GRAFTS+WND DEBR FOR ENDOC,NUTR+META DIS	1.869	1.479	2.688*	1.592*	28.11	28.29*
288	OR PROCEDURES FOR OBESITY	2.655*	2.115*	1.658*	2.522*	24.71*	10.19*
289	PARATHYROID PROCEDURES	1.597*	1.894*	1.505	2.469	16.03*	12.17
290	THYROID PROCEDURES	0.839	1.488	0.692	1.543	9.56	7.01
291	THYROGLOSSAL PROCEDURES	0.572*	0.885*	0.451*	1.190*	6.59*	4.66*
292	OTH ENDOC,NUTR+METAB OR PROCS AGE>69 +/OR CC	2.335	2.986	1.878	2.639	29.21	16.43
293	OTH ENDOC,NUTR+METAB OR PROCS AGE<70 W/O CC	1.889	2.883	1.070	2.389	23.91	9.72
294	DIABETES AGE>36	0.787	0.530	0.720	0.483	13.29	10.59
295	DIABETES AGE 0-35	0.724	0.458	0.602	0.424	11.35	7.92
296	NUTR+MISC META DISORDERS AGE>69 +/OR CC	0.909	0.568	0.755	0.489	14.68	11.00
297	NUTR+MISC META DISORDERS AGE 18-69 W/O CC	0.760	0.537	0.747	0.495	11.67	9.37
298	NUTR+MISC META DISORDERS AGE 0-17	0.699	0.463	0.000*	0.000*	12.66	0.00*
299	INBORN ERRORS OF METABOLISM	0.789	0.521	1.136	0.700	10.08	11.31
300	ENDOCRINE DISORDERS AGE>69 AND/OR CC	0.912	0.660	0.985	0.743	13.90	11.84
301	ENDOCRINE DISORDERS AGE<70 W/O CC	0.681	0.510	0.860	0.735	10.26	9.24
302	KIDNEY TRANSPLANT	5.184	5.161	11.178	5.040	33.77	27.56
303	KIDNEY,URETER+MAJ BLADDER PROCS FOR NEOPLASM	1.745	2.745	3.111	3.718	19.23	19.74
304	KIDNEY,URETER+MAJ BLADDER PROCS NON-MALIG AGE>69 O	1.647	2.298	1.638	2.523	19.18	14.86

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
305	KIDNEY,URETER+MAJ BLADDER PROCS NONMALG AGE<70 W/O	1.301	2.057	1.619	2.432	15.07	13.96
306	PROSTATECTOMY AGE>69 AND/OR CC	1.150	1.883	1.419	2.201	14.95	12.50
307	PROSTATECTOMY AGE<70 W/O CC	0.973	1.790	0.933	1.980	12.62	9.30
308	MINOR BLADDER PROCS AGE>69 AND/OR CC	1.443	1.858	1.721*	2.081*	20.96	12.06*
309	MINOR BLADDER PROCS AGE<70 W/O CC	1.256	1.736	0.867*	1.300*	18.66	8.79*
310	TRANSURETHRAL PROCS AGE>69 +/OR CC	0.594	0.953	1.353*	1.683*	8.09	10.85*
311	TRANSURETHRAL PROCS AGE<70 W/O CC	0.477	0.864	1.884*	1.787*	6.33	13.09*
312	URETHRAL PROCS AGE>69 +/OR CC	0.467	0.753	1.199	1.101	6.73	7.97
313	URETHRAL PROCS AGE 18-69 W/O CC	0.569	0.799	0.658*	0.936*	7.56	6.64*
315	OTH KIDNEY+URINARY TRACT OR PROCS	2.357	2.720	2.406	2.329	23.57	14.39
316	RENAL FAILURE W/O DIALYSIS	1.149	0.776	1.507	0.831	13.19	12.69
317	RENAL FAILURE WITH DIALYSIS	0.823*	0.886*	0.000*	0.000*	12.76*	0.00*
318	KIDNEY+URIN TRACT NEOPLASM AGE>69 +/OR CC	0.895	0.669	1.019	0.872	13.76	11.99
319	KIDNEY+URIN TRACT NEOPLASM AGE<70 W/O CC	0.661	0.640	0.892	0.834	10.11	9.36
320	KIDNEY+URIN TRACT NEOPLASM AGE>69 +/OR CC	0.817	0.549	0.770	0.492	13.13	11.18
321	KIDNEY+URIN TRACT INFEC AGE 18-69 W/O CC	0.698	0.550	0.690	0.481	10.83	9.00
322	KIDNEY+URIN TRACT INFEC AGE 0-17	0.790	0.509	3.148*	0.557*	13.41	11.00*
323	URINARY STONES AGE>69 AND/OR CC	0.534	0.502	0.649	0.629	8.31	8.59
324	URINARY STONES AGE<70 W/O CC	0.416	0.422	0.475	0.500	7.22	6.30
325	KIDNEY+URIN TRACT SIGNS+SYMPS AGE>69 +/OR CC	0.653	0.596	0.690	0.590	10.66	9.04
326	KIDNEY+URIN TRACT SIGNS+SYMPS AGE 18-69 W/O CC	0.497	0.557	0.633	0.565	7.95	7.48
327	KIDNEY+URIN TRACT SIGNS+SYMPS AGE 0-17	0.582	0.444	0.000*	0.000*	10.21	0.00*
328	URETHRAL STRICTURE AGE>69 +/OR CC	0.541	0.566	0.743	0.641	8.14	9.46
329	URETHRAL STRICTURE AGE 18-69 W/O CC	0.621	0.574	0.735	0.738	8.15	8.17
330	URETHRAL STRICTURE AGE 0-17	0.437*	0.447*	0.000*	0.000*	7.14*	0.00*
331	OTH KIDNEY+URIN TRACT DXS AGE>69 +/OR CC	0.884	0.706	0.955	0.700	13.09	10.74
332	OTH KIDNEY+URIN TRACT DXS AGE18-69 W/O CC	0.702	0.646	0.868	0.693	9.65	8.44
333	OTH KIDNEY+URIN TRACT DXS AGE 0-17	0.780	0.618	0.750*	0.277*	14.28	3.00*
334	MAJOR MALE PELVIC PROCS W CC	1.177	2.135	1.155	2.335	15.87	15.86
335	MAJOR MALE PELVIC PROCS W/O CC	1.132	2.021	1.200	2.364	14.84	12.70
336	TURP AGE>69 +/OR CC	0.911	1.671	0.922	1.946	11.94	10.21
337	TURP AGE<70 W/O CC	0.734	1.538	0.803	1.874	9.55	8.62
338	TESTES PROCS FOR MALIGNANCY	0.967	1.240	0.805	1.014	12.63	7.88
339	TESTES PROCS NONMALIGNANCY AGE>70	0.553	0.890	0.600	0.888	7.49	6.57
340	TESTES PROCS NONMALIGNANCY AGE 0-17	0.745*	1.043*	0.000*	0.000*	12.50*	0.00*
341	PENIS PROCEDURES	0.781	1.291	1.443	2.575	9.21	7.48
342	CIRCUMCISION AGE >17	0.337	0.424	0.000*	0.000*	4.11	0.00*
343	CIRCUMCISION AGE 0-17	0.818*	0.642*	0.000*	0.000*	13.33*	0.00*
344	OTH MALE REPRO SYS OR PROCS FOR MALG	0.877	1.236	1.988*	2.449*	10.01	12.24*
345	OTH MALE REPRO SYS OR PROCS EXC MALG	0.635	0.921	1.005	1.345	8.27	11.60
346	MALIGNANCY, MALE REPRO SYS AGE>69 +/OR CC	0.826	0.664	0.882	0.725	12.78	11.54
347	MALIGNANCY, MALE REPRO SYS AGE<70 W/O CC	0.630	0.602	0.759	0.720	9.79	8.67
348	BENIGN PROSTATIC HYPERTROPHY AGE>69 +/OR CC	0.564	0.603	0.694	0.762	8.23	8.07
349	BENIGN PROSTATIC HYPERTROPHY AGE<70 W/O CC	0.425	0.547	0.567	0.737	6.21	6.64
350	INFLAMMATION MALE REPROD SYSTEM	0.572	0.474	0.613	0.477	9.29	7.94
352	OTH MALE REPROD SYS DIAGNOSES	0.609	0.590	0.523	0.695	8.88	6.87
353	PELVIC EVIS,RADICAL HYSTERECTOMY+VULVECTOMY	1.383	1.873	1.930*	3.011*	16.67	12.77*
354	NONRADICAL HYSTERECTOMY AGE>69 +/OR CC	1.030	1.682	1.173	1.933	12.47	11.12
355	NONRADICAL HYSTERECTOMY AGE<70 W/O CC	0.856	1.574	1.058	1.825	10.46	10.10
356	FEMALE REPROD SYS RECONSTRUCTIVE PROCS	0.715	1.154	0.780	1.271	10.16	9.23

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
357	UTERUS+ADENEXA PROCS FOR MALIGNANCY	1.534*	1.855*	2.610*	2.853*	19.26*	16.19*
358	UTERUS+ADENEXA PROCS FOR NONMALIG EX TUBAL INTER	1.014	1.406	1.257	1.585	12.69	10.73
359	TUBAL INTERRUPTION FOR NONMALIGNANCY	1.381*	2.248*	0.000*	0.000*	23.00*	0.00*
360	VAGINA,CERVIX+VULVA PROCS	0.594	0.758	0.723	0.955	8.31	7.31
361	LAPAROSCOPY+ENDOSCOPY (FEMALE) EXC TUBAL INTRP	0.281*	0.718*	0.703*	1.025*	3.50*	6.62*
362	LAPAROSCOPIC TUBAL INTERRUPTION	0.265*	0.660*	0.000*	0.000*	3.00*	0.00*
363	D+C, CONIZATION+RADIO-IMPL FOR MALIG	0.499	0.699	0.873	0.789	6.61	5.41
364	D+C, CONIZATION EXC MALIG	0.313	0.483	0.392	0.564	4.07	4.06
365	OTH FEMALE REPROD SYS OR PROCS	1.634	1.693	1.688	1.739	20.79	14.00
366	MALIGNANCY OF FEMALE REPROD SYS AGE>69 +/OR CC	0.891	0.576	0.987	0.645	13.64	10.01
367	MALIGNANCY OF FEMALE REPROD SYS AGE<70 W/O CC	0.762	0.545	0.730	0.469	10.23	6.09
368	INFECTIONS, FEMALE REPROD SYS	0.813	0.579	0.631	0.550	12.94	9.41
369	MENSTRUAL+OTH FEMALE REPROD SYS DISORDERS	0.600	0.572	0.739	0.640	9.33	8.79
370	CESAREAN SECTION W CC	0.816*	0.723*	0.000*	0.000*	10.00*	0.00*
371	CESAREAN SECTION W/O CC	0.696*	1.123*	1.803*	1.698*	10.81*	14.39*
372	VAGINAL DELIVERY W COMPLICATED DX	0.000*	0.000*	0.377*	0.572*	0.00*	6.00*
373	VAGINAL DELIVERY W/O COMPLICATED DX	0.644*	0.492*	0.303*	0.231*	13.81*	5.19*
376	POSTPARTUM DX W/O OR PROC	3.175*	0.873*	0.000*	0.000*	173.00*	0.00*
378	ECTOPIC PREGNANCY	0.143*	0.141*	0.000*	0.000*	3.00*	0.00*
379	THREATENED ABORTION	0.373*	0.480*	0.326*	0.532*	5.50*	4.50*
380	ABORTION W/O D+C	1.161*	1.115*	0.823*	0.859*	9.00*	12.00*
381	ABORTION WITH D+C	0.195*	0.461*	0.000*	0.000*	9.00*	0.00*
383	OTH ANTEPARTUM DX W MED COMPLICATIONS	0.299*	0.367*	0.597*	0.244*	6.50*	6.25*
384	OTH ANTEPARTUM DX W/O MED COMPLICATIONS	0.337*	0.368*	0.000*	0.000*	4.00*	0.00*
385	NEONATES, DIED OR TRANSFERRED	1.020*	0.718*	0.000*	0.000*	13.19*	0.00*
386	EXTREME IMMATURITY, NEONATE	0.806*	0.468*	0.000*	0.000*	11.45*	0.00*
389	FULL TERM NEONATE W MAJOR PROBLEMS	1.407*	0.930*	0.348*	0.299*	18.00*	3.50*
390	NEONATES W OTHER SIGNIFICANT PROBLEMS	0.873*	0.792*	0.365*	0.235*	12.09*	4.00*
391	NORMAL NEWBORNS	0.328*	0.164*	0.938*	0.420*	6.00*	2.00*
392	SPLENECTOMY AGE>17	2.653	2.353	2.730*	2.736*	27.13	18.86*
393	SPLENECTOMY AGE 0-17	8.899*	3.644*	0.000*	0.000*	14.00*	0.00*
394	OTHER OR PROCS OF BLOOD+BLOOD FORMING ORGANS	0.766	0.975	1.874*	1.095*	10.63	9.39*
395	RED BLOOD CELL DISORDERS AGE>17	0.721	0.566	0.719	0.513	11.51	9.19
396	RED BLOOD CELL DISORDERS AGE 0-17	0.723	0.468	0.000*	0.000*	11.77	0.00*
397	COAGULATION DISORDERS	0.807	0.566	1.306	0.596	11.91	9.70
398	RETICULO+IMMUNITY DISORDERS AGE>69 +/OR CC	0.852	0.598	0.973	0.641	12.13	10.35
399	RETICULO+IMMUNITY DISORDERS AGE<70 W/O CC	0.807	0.658	1.063	0.612	11.31	9.32
400	LYMPHOMA OR LEUKEMIA W MAJ OR PROCS	2.605*	3.385*	4.188*	3.291*	22.70*	23.85*
401	LYMPHOMA OR LEUKEMIA W MINOR PROC AGE >69 +/OR CC	0.869	1.070	1.333*	1.768*	12.16	11.11*
402	LYMPHOMA OR LEUKEMIA W MINOR OR PROC AGE<70 W/O CC	0.933	1.164	1.019*	0.903*	12.35	6.59*
403	LYMPHOMA OR LEUKEMIA AGE>69 +/OR CC	1.126	0.712	1.243	0.689	15.08	12.22
404	LYMPHOMA OR LEUKEMIA AGE 18-69 W/O CC	0.988	0.666	1.165	0.689	12.97	11.06
405	LYMPHOMA OR LEUKEMIA AGE 0-17	1.086	0.659	0.000*	0.000*	16.36	0.00*
406	MYEL DISO PLY DIF NEOP W MAJ OR PROC + CC	2.850*	3.181*	0.000*	0.000*	28.79*	0.00*
407	MYEL DISO PLY DIF NECP W MAJ OR PROC W/O CC	2.014*	2.772*	2.294*	3.114*	21.11*	12.76*
408	MYEL DISO PLY DIF NELP W MNR OR PROC	1.007	1.488	0.805*	0.970*	13.84	7.52*
409	RADIOTHERAPY	1.080	0.758	0.537	0.393	17.11	6.23
410	CHEMOTHERAPY	0.337	0.249	0.360	0.205	5.38	3.71
411	HISTORY OF MALIGNANCY W/O ENDOSCOPY	0.480*	0.384*	0.582	0.452	5.00*	7.09
412	HISTORY OF MALIGNANCY W ENDOSCOPY	0.332	0.456	0.498*	0.708*	4.38	5.61*

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

		RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
DRG	TITLE	PART A	PART B	PART A	PART B		
413	OR MYEL DISORD PRLY DIF NEOP AGE>69 +/OR CC	0.874	0.629	0.965	0.793	13.97	13.33
414	OR MYEL DISORD PRLY DIF NEOP DX AGE<70 W/O CC	0.825	0.681	0.879	0.815	12.09	10.41
415	OR PROCS FOR INFECT+PARAS DISEASES	2.296	2.065	3.039*	2.323*	26.07	18.06*
416	SEPTECEMIA AGE>17	1.205	0.670	1.286	0.664	15.77	14.57
417	SEPTECEMIA AGE 0-17	1.600	0.715	0.000*	0.000*	18.67	0.00*
418	POSTOP+POSTTRAUMATIC INFECT	0.922	0.504	1.494	0.668	14.09	12.76
419	FEVER UNKNWN ORIGIN AGE>69 +/OR CC	0.878	0.571	0.879	0.499	12.94	10.06
420	FEVER UNKNWN ORIGIN AGE 18-69 W/O CC	0.885	0.638	0.857	0.486	12.96	8.76
421	VIRAL ILLNESS AGE>17	0.521	0.390	0.515	0.338	8.87	7.25
422	VIRAL ILLNESS+FEVER UNKNWN ORIGIN AGE 0-17	0.504*	0.317*	0.000*	0.000*	9.31*	0.00*
423	OTHER INFECT+PARAS DISEASES DXS	1.239	0.706	1.269	0.653	15.44	12.50
424	OTHER PROCS W PRINCIPAL DX OF MENTAL ILLNESS	1.994	2.275	1.766*	1.286*	30.01	24.50*
425	ACUTE ADJ REACT+DIST PSYCHSOCIAL DYSFUNCTION	0.613	0.522	0.697	0.478	11.47	10.15
426	DEPRESSIVE NEUROSES	0.851	0.801	0.864	0.639	16.87	14.61
427	NEUROSES EXC DEPRESSIVE	0.830	0.700	0.627	0.802	17.17	14.83
428	DISORDERS OF PERSONALITY+IMPULSE CONTROL	1.139	0.612	0.951	0.703	17.35	16.03
429	ORGANIC DISTURBANCES+MENTAL RETARDATION	0.918	0.683	0.819	0.547	18.49	15.34
430	PSYCHOSES	1.109	0.951	0.945	0.650	21.29	16.13
431	CHILDHOOD MENTAL DISORDERS	0.955*	0.640*	0.872*	0.654*	11.90*	9.50*
432	OTHER DXS OF MENTAL DISORDERS	0.802*	0.562*	0.631	0.579	15.35*	8.75
434	DRUG DEPENDENCE	0.589*	0.604*	0.752*	0.384*	14.79*	18.66*
435	DRUG USE EXC DEPENDENCE	0.668*	0.552*	0.703*	0.499*	12.66*	11.07*
436	ALCOHOL DEPENDENCE	0.899	0.549	0.637*	0.430*	17.34	9.17*
437	ALCOHOL USE EXC DEPENDENCE	0.692	0.556	0.563	0.334	11.54	9.65
438	ALCOHOL+SUBS INDUCED ORGANIC MENTAL SYNDROME	0.693	0.549	0.588	0.351	12.73	9.43
439	SKIN GRAFTS FOR INJURIES	0.888*	1.005*	1.085*	0.833*	14.11*	13.87*
440	WOUND DEBRIDEMENTS FOR INJURIES	1.607*	1.580*	2.013*	1.096*	25.33*	23.66*
441	HAND PROCEDURES FOR INJURIES	0.653*	0.899*	1.176*	1.841*	9.75*	4.85*
442	OTHER OR PROCS FOR INJURIES AGE>69 +/OR CC	1.548*	2.460*	1.997	2.562	16.03*	15.47
443	OTHER OR PROCS FOR INJURIES AGE<70 W/O CC	1.151*	2.195*	1.763	2.332	21.89*	11.72
444	MULTIPLE TRAUMA AGE>69 +/OR CC	0.825	0.685	0.808	0.490	13.75	13.42
445	MULTIPLE TRAUMA AGE 18-69 W/O CC	0.915	0.819	0.685	0.466	14.40	10.92
446	MULTIPLE TRAUMA AGE 0-17	0.655*	0.465*	0.000*	0.000*	11.83*	0.00*
447	ALLERGIC REACTIONS >17	0.400	0.275	0.553	0.379	6.38	7.81
449	TOXIC EFFECTS OF DRUGS AGE>69 +/OR CC	0.778	0.546	0.751	0.434	11.55	9.32
450	TOXIC EFFECTS OF DRUGS AGE18-69 W/O CC	0.682	0.494	0.617	0.369	10.26	7.27
451	TOXIC EFFECTS OF DRUGS AGE0-17	0.582	0.452	0.000*	0.000*	9.92	0.00*
452	COMPLCATIONS OF TREATMENT AGE>69 +/OR CC	0.939	0.533	0.902	0.616	14.01	11.53
453	COMPLCATIONS OF TREATMENT AGE<70 W/O CC	0.903	0.605	1.097	0.788	12.40	11.02
454	OTH INJURIES,POIS+TOXIC EFF DXS AGE69 +/OR CC	1.117	0.692	0.837	0.482	15.67	10.46
455	OTH INJURISE,POIS+TOXIC EFF DXS AGE<70 W/O CC	0.628	0.351	1.170*	0.490*	10.00	14.21*
457	EXTENSIVE BURNS	11.251*	1.729*	10.160*	0.665*	24.00*	12.50*
458	NONEXTENSIVE BURNS W SKIN GRAFTS	2.276*	1.708*	5.621*	1.650*	32.33*	26.00*
459	NONEXTENSIVE BURNS W WOUND DEBRIDE	4.100*	3.249*	2.497*	1.607*	35.77*	28.09*
460	NONEXTENSIVE BURNS W/O OR PROCEDURE	1.223	0.679	1.434	1.092	18.24	18.75
461	OR PROC W DIAG OT CONTACT W HEALTH SVS	1.118	1.467	2.102*	2.254*	13.68	14.45*
462	REHABILITATION	0.308*	0.133*	1.733	0.531	6.00*	27.64
463	SIGNS+SYMPTOMS WITH CC	0.903	0.620	0.000*	0.000*	13.43	0.00*
464	SIGNS+SYMPTOMS W/O CC	0.783	0.595	0.912	0.580	12.23	10.39
465	AFTERCARE W HX OF MALIG AS SECONDARY DX	0.307	0.423	0.000*	0.000*	3.46	0.00*

* MEANS BASED ON LESS THAN 30 OBSERVATIONS

DRG	TITLE	RELATIVE WEIGHTING FACTORS				MEAN LENGTH OF STAY	
		NEW JERSEY		NORTH CAROLINA		N.J.	N.C.
		PART A	PART B	PART A	PART B		
466	AFTERCARE W/O HX OF MALIG AS SECONDARY DX	0.258	0.340	0.814*	0.502*	3.47	9.57*
467	OTHER FACTORS INFLUENCING HEALTH STATUS	0.391	0.420	0.968	0.695	6.35	9.91
468	UNRELATED OR PROCEDURE	1.455	1.977	1.639	2.213	16.77	14.20
469	PDX INVALID AS DISCHARGE DIAG	0.470*	0.517*	0.873	0.542	9.75*	10.94
470	UNGROUPABLE	0.796	0.651	1.060	0.655	21.54	10.88

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